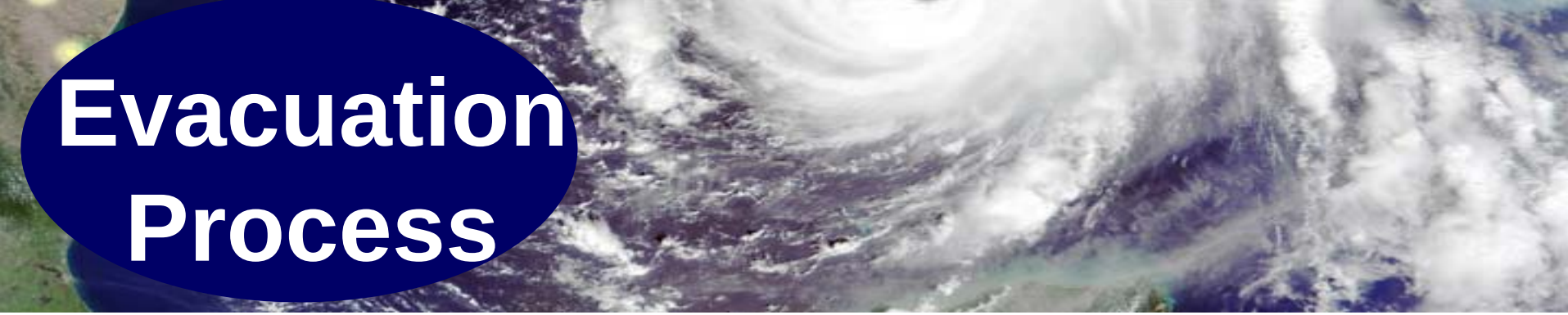
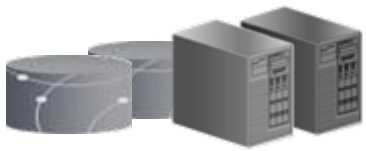
Special Needs Evacuation Tracking System

Lesia Dickinson & Gordon Wells

Evacuation Process





University of Texas -
Center for Space Research
Database / Tracking Server

AT&T
Wireless
Network

Evacuee
Intake

Bus Loading

Bus Tracking

Destination
Processing

Communications

AT&T Communications Center

GSM

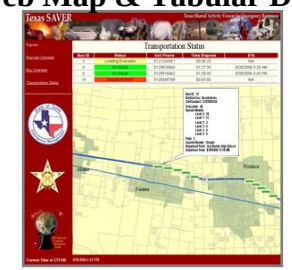
Evacuee Enrollment

Bus Embarkation

Bus Tracking

Internet

Web Map & Tabular Data



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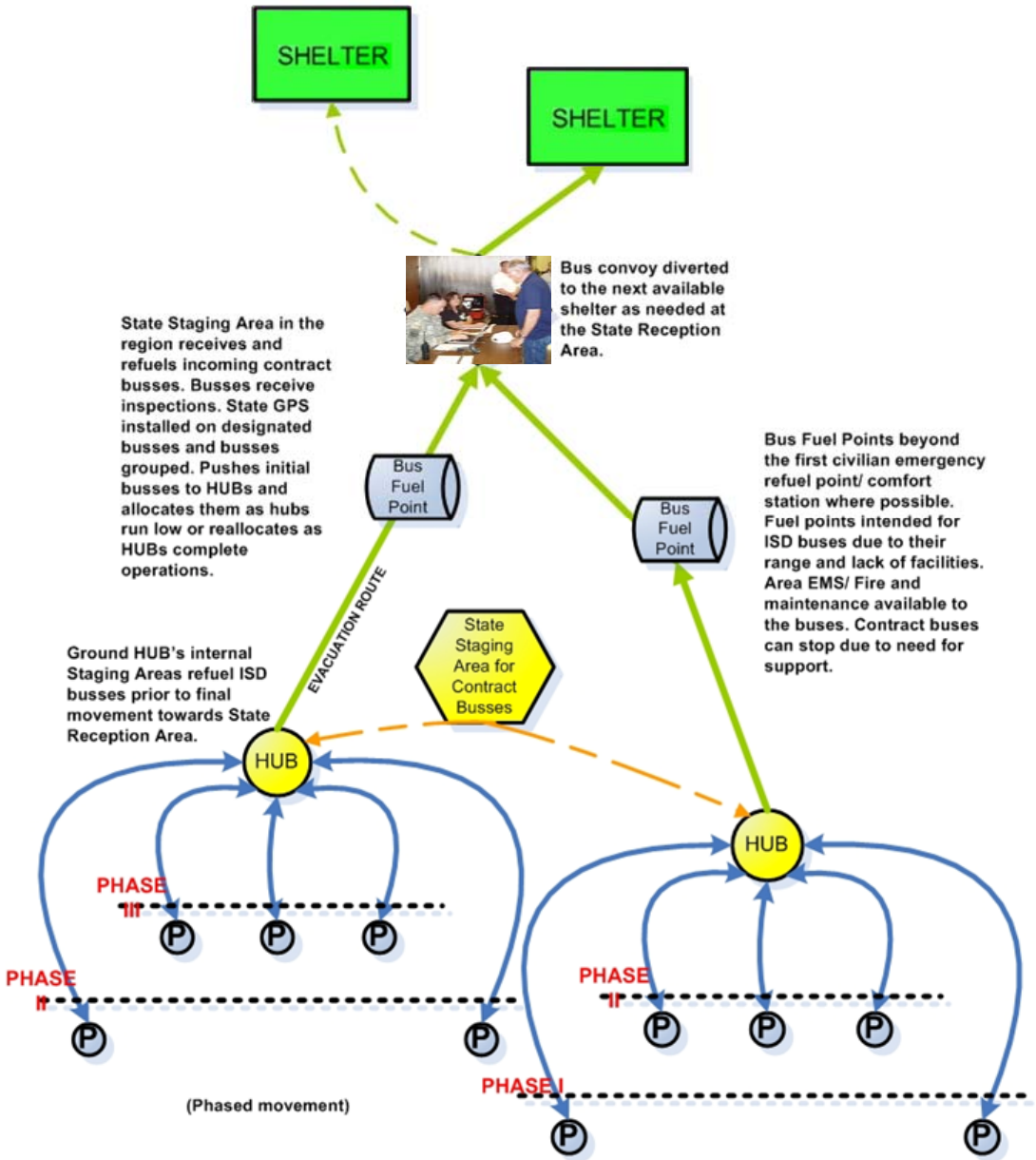
Center for Space Research

Database / Command & Control Displays

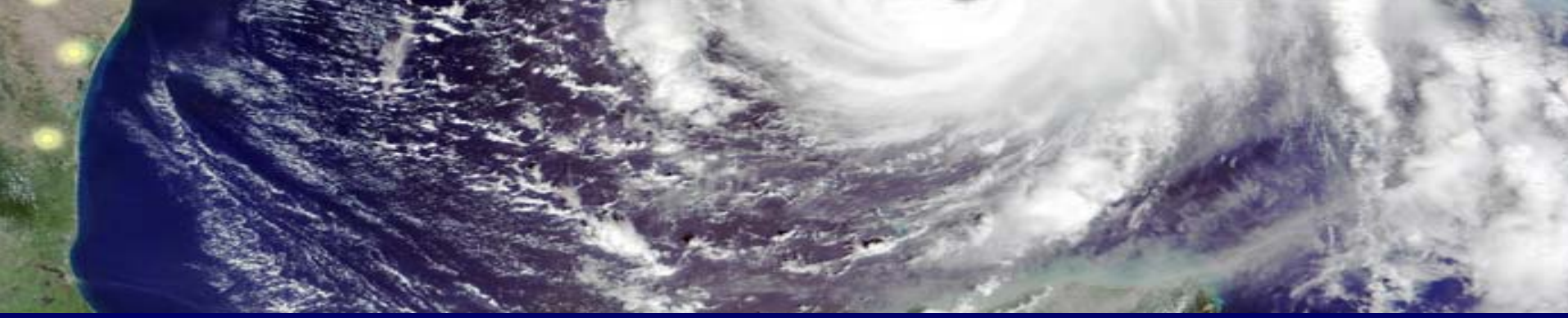
Shelter Tracking

Tracking System Functions

REGIONAL EVACUATION OPERATIONS

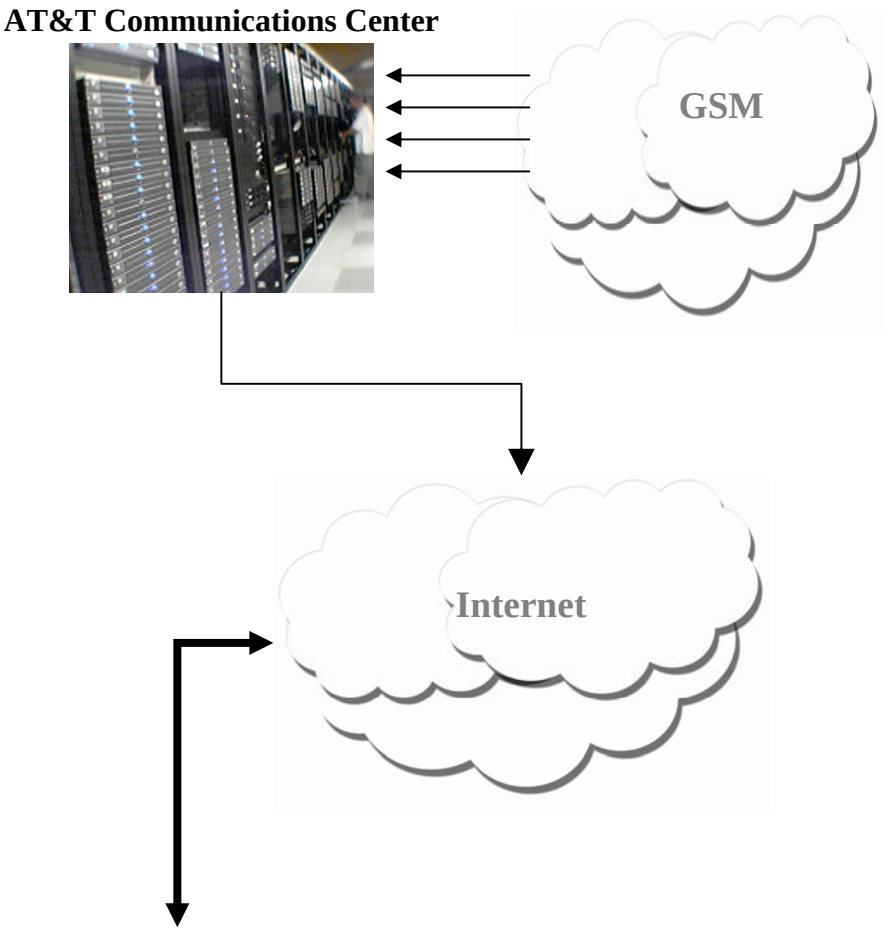


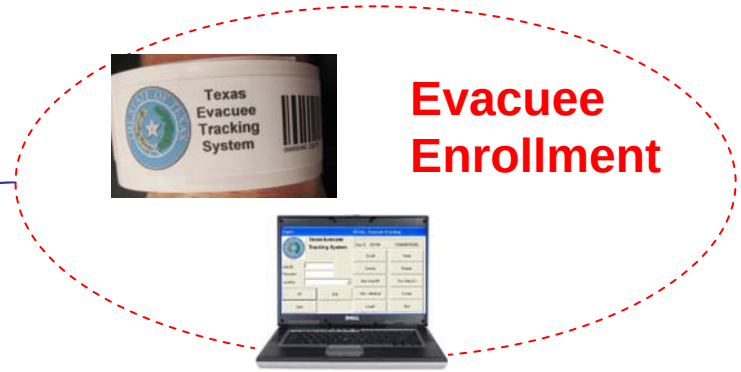
- **Evacuees arrive at local pick-up points (elementary schools, etc.)**
- **Local resources used to transport to State Transportation Hubs**
- **Texas Military Forces staff State Hubs**



Evacuee Enrollment

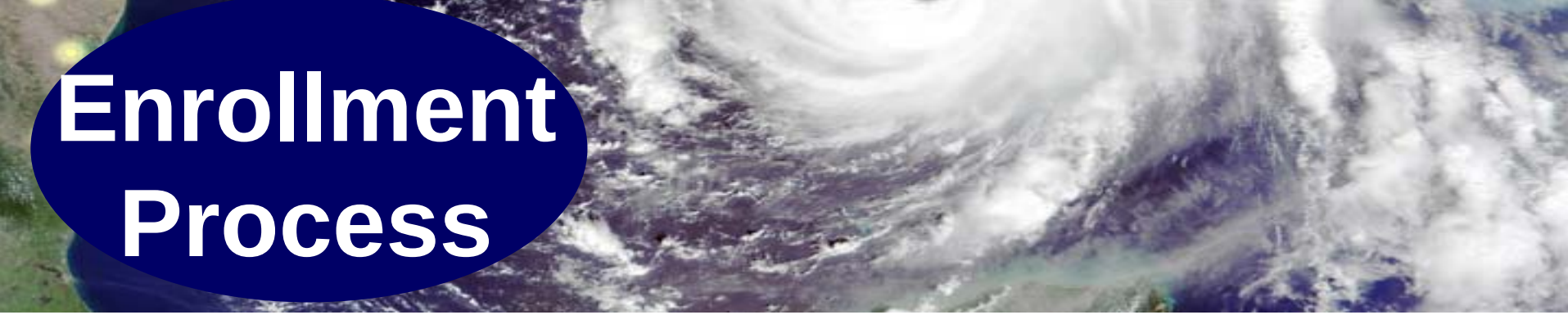
Tracking System Functions





Enrollment Overview:

- Laptops equipped with Evacuee Enrollment Software, cellular wireless data cards, USB barcode scanners and magnetic stripe readers
- RFID / Barcode wristbands
- Pet tags
- Medical equipment tags



Enrollment Process

Collect Key Evacuee Information:

- Name
- DOB
- Address
- Driver’s License (if available)
- Family Unit Identification
- Pets associated with family unit
- Medical Assets associated with evacuee

State of Texas Evacuee Information

Official Use Only:

Total # Family____
Total # Pets_____

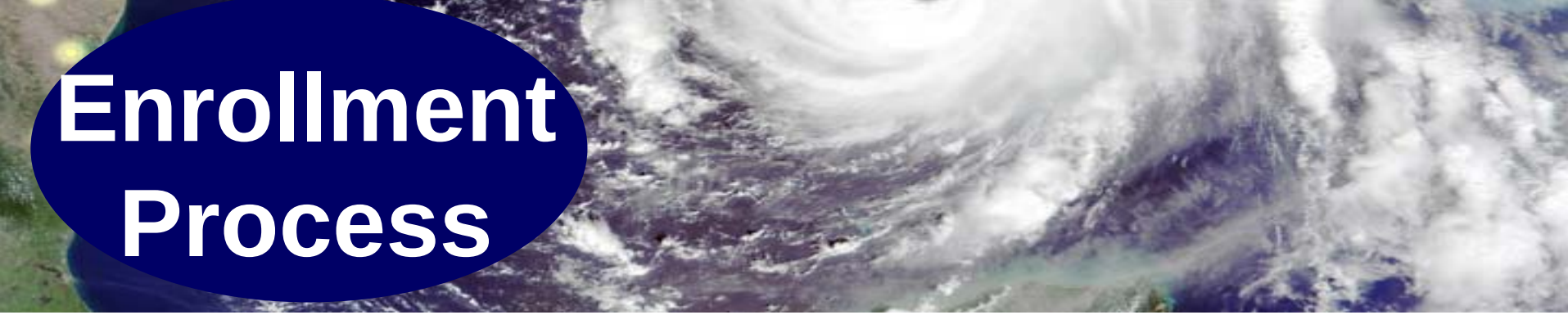
Please use CAPITAL LETTERS ONLY

	FAMILY HEAD / MEMBER ___	FAMILY MEMBER ___
LAST NAME		
FIRST NAME		
ADDRESS		
ZIP CODE		
DATE OF BIRTH	Month Day Yr	Month Day Yr
WRISTBAND # (Guard Use only)		

	FAMILY MEMBER ___	FAMILY MEMBER ___
LAST NAME		
FIRST NAME		
ADDRESS		
ZIP CODE		
DATE OF BIRTH	Month Day Yr	Month Day Yr
WRISTBAND # (Guard Use only)		

	FAMILY MEMBER ___	FAMILY MEMBER ___
LAST NAME		
FIRST NAME		
ADDRESS		
ZIP CODE		
DATE OF BIRTH	Month Day Yr	Month Day Yr
WRISTBAND # (Guard Use only)		

PETS	PET 1 NAME	PET 1 NAME
WRISTBAND # (Guard Use only)		



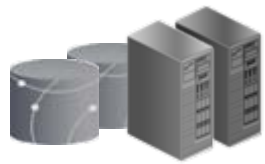
Enrollment Process

- Unique number on a wristband matched to a database record
- When wristband barcode is scanned or “seen” by RFID readers, it can be tracked in UT database.
- Wristbands will be worn throughout the evacuation and shelter period and can be disposed of afterwards

at&t

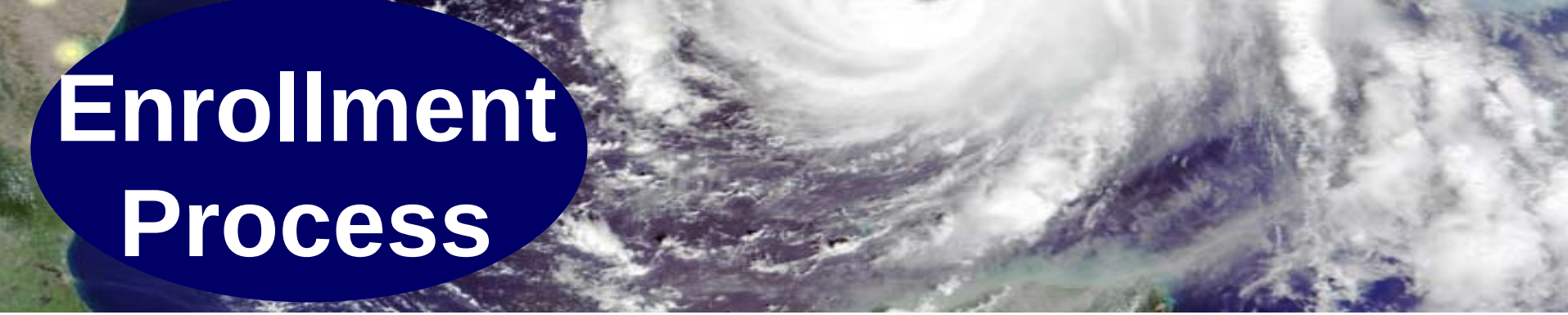
Check-In Process

Internet



Database Update

Evacuee Information Form

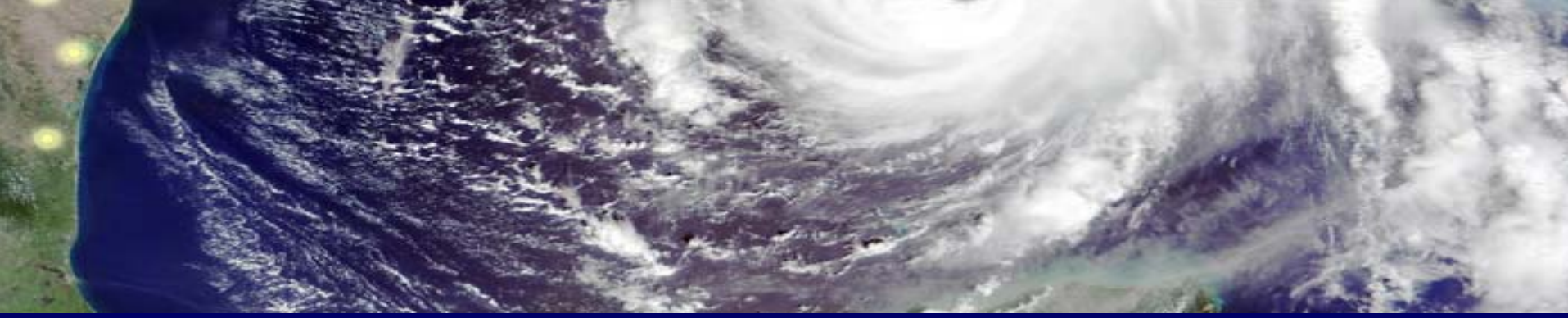


Enrollment Process

- Quick Processing: Approximately 30 seconds to enroll evacuee in database
- Driver license used when available to make data entry quick via a magnetic strip card reader
- Pets must be included in the evacuation tracking process

Pasadena Evacuation Exercise

May 2007



Bus Loading

Tracking System Functions

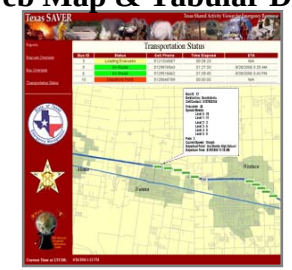
AT&T Communications Center

GSM

Bus Embarkation

Internet

Web Map & Tabular Data



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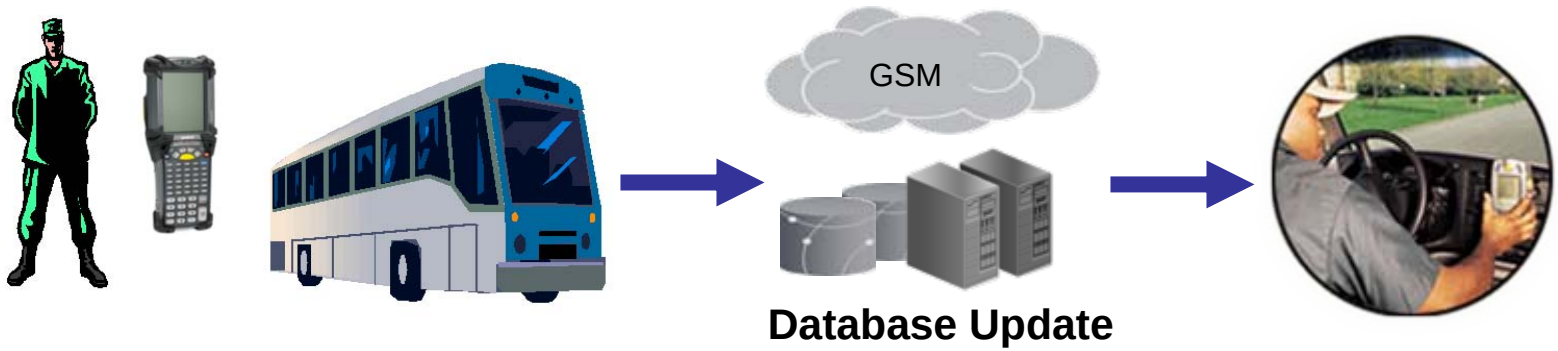
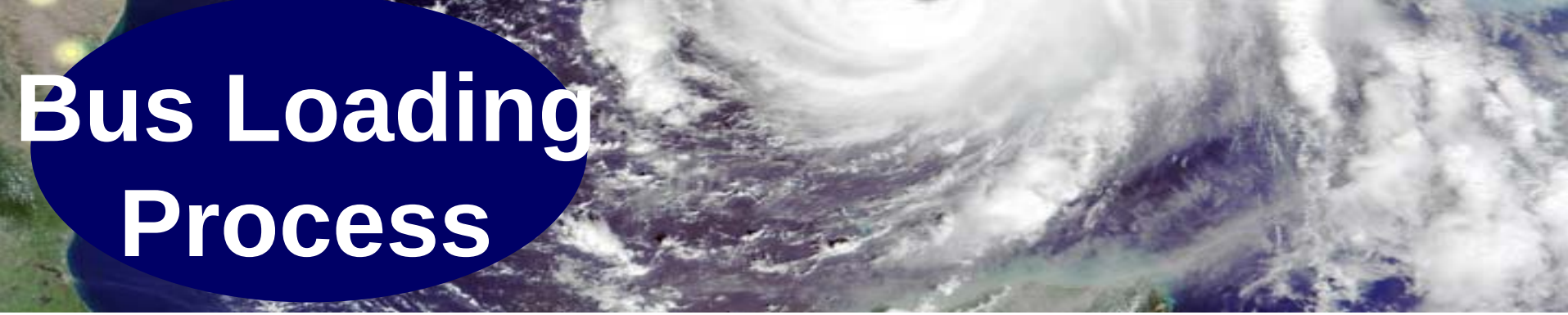
CSR
Center for Space Research

Bus Embarkation Overview:

- Motorola Scanners will scan barcode wrist-bands and associate evacuees with a particular bus
- Zebra printers will print paper manifest for bus driver and Texas Military Forces

Loading Process





Bus Loading Process

- Buses pre-staged with a unique bar code number
- Military Personnel initiate bus loading via Motorola Handheld Scanner
- Evacuees wristband scanned at the bus door
- Pets / medical assets also scanned
- Two Bus Manifests printed after bus is loaded
  - One copy of the manifest goes with driver
  - TMF retains a copy of the manifest

Hardware Overview

Touch Screen

Microphone

Headphone Jack (Windows Mobile 5.0 only)

Scan Button or Walkie-Talkie Button

Separate Scan Button (not visible from this angle)

Indicator LED Bar

Scan Button

Power Button

Keypad

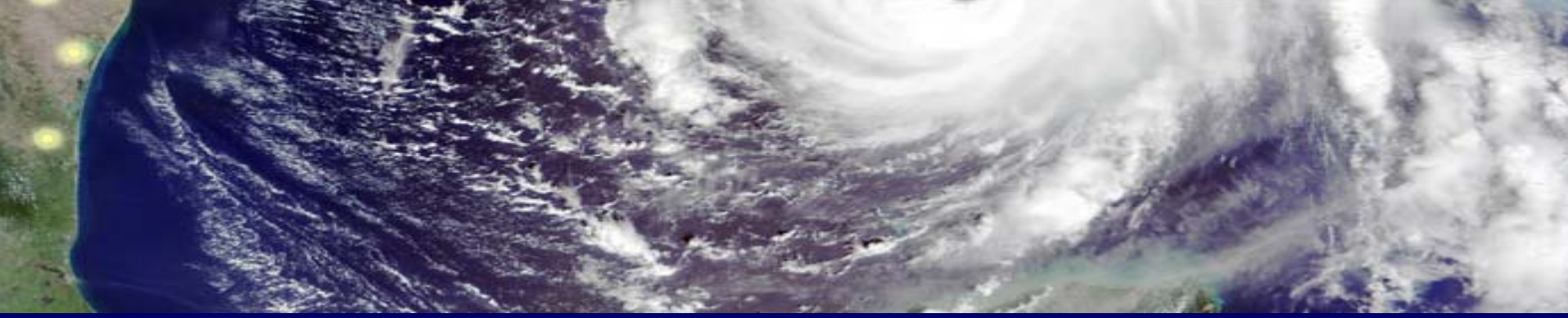
Stylus and SIM Door located behind the unit

Battery Release Latch

Enter Button

Pasadena Evacuation Exercise

May 2007



Bus Tracking

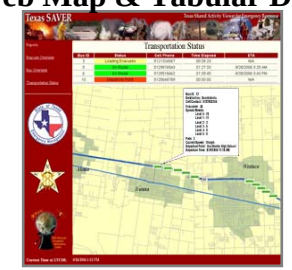
Tracking System Functions

AT&T Communications Center

GSM

Internet

Web Map & Tabular Data



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C S R
Center for Space Research

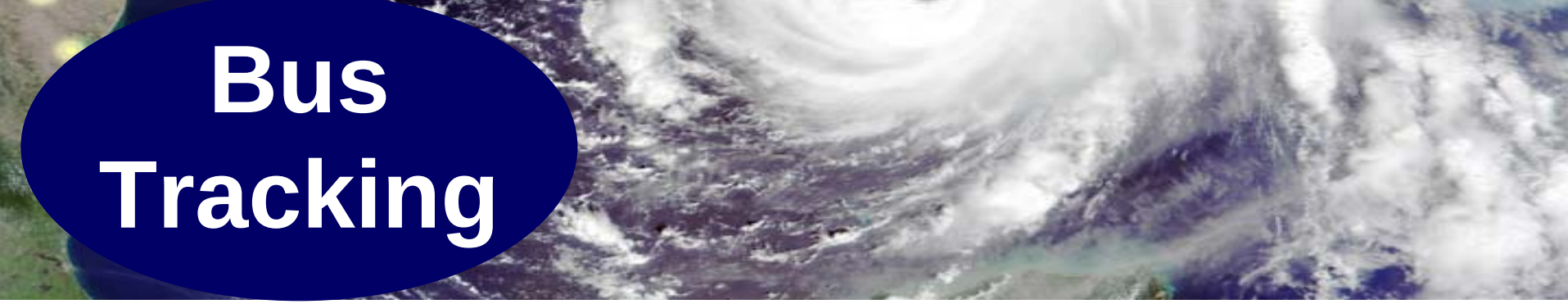
Bus Tracking Overview:

- GPS devices with integrated wireless modems report location of bus or bus convoy at 30-second intervals
- Cell phone in the GPS kit communicates with driver as necessary
- Automatic alarms are triggered at the SOC by unplanned stop, failure to follow route, etc.

Bus Tracking

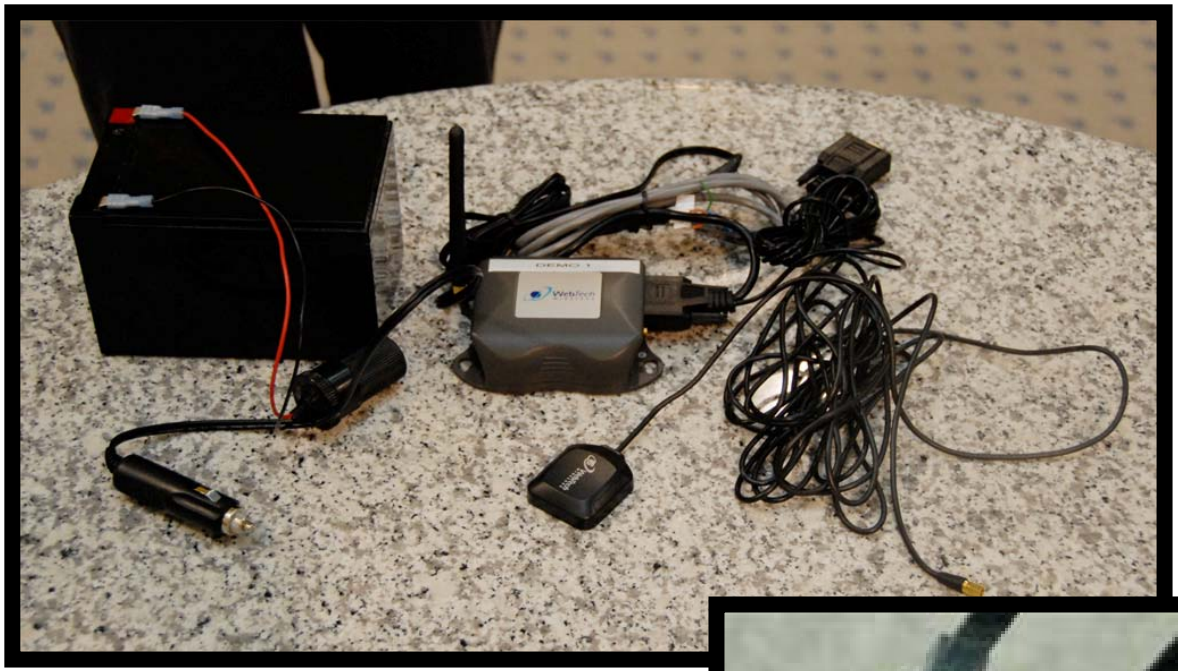
Bus Tracking

WebTech GPS systems equipped with wireless modems communicate by GSM to AT&T network servers which relay data to the UTCSR enterprise tracking servers.

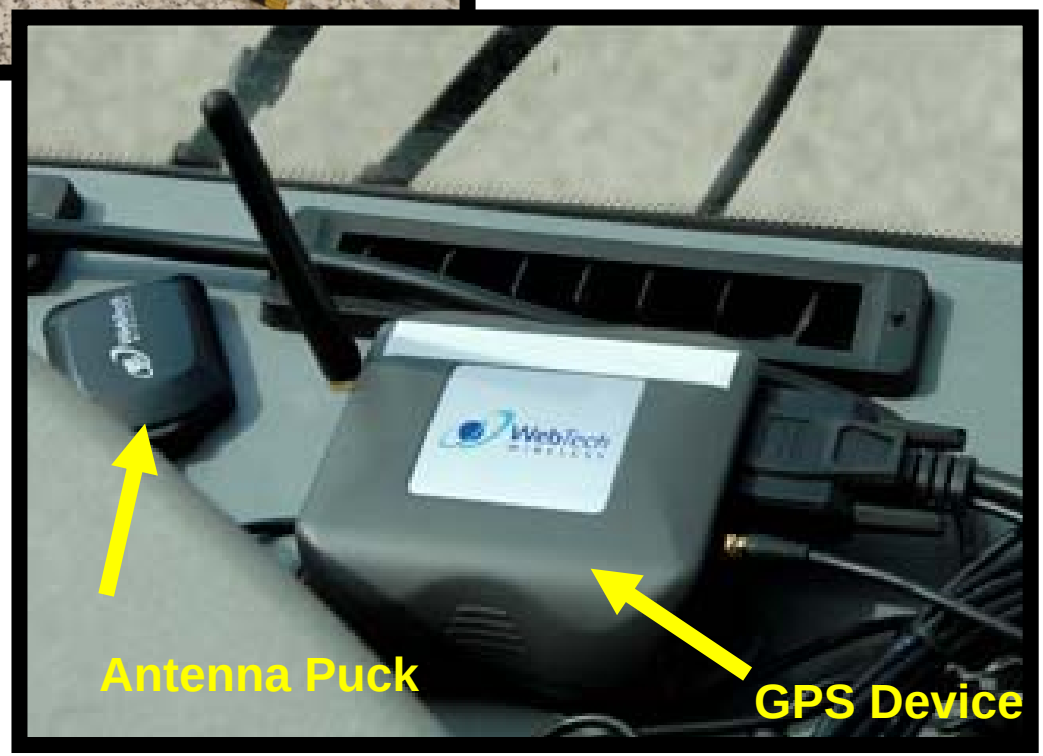


Bus Tracking

- GPS Tracking devices and cell phone in bus / convoy
- Database knows bus route / destination
- Alarm in State Operations Center when bus deviates from route
- Exact location in case of need for air/ground support
- Provides real-time status of evacuees en route
- Provides ETA to receiving Fuel Stops, Reception Centers and Shelters



GPS Components
Prior to kitting



On-dash position

Camp Mabry Evacuation Exercise

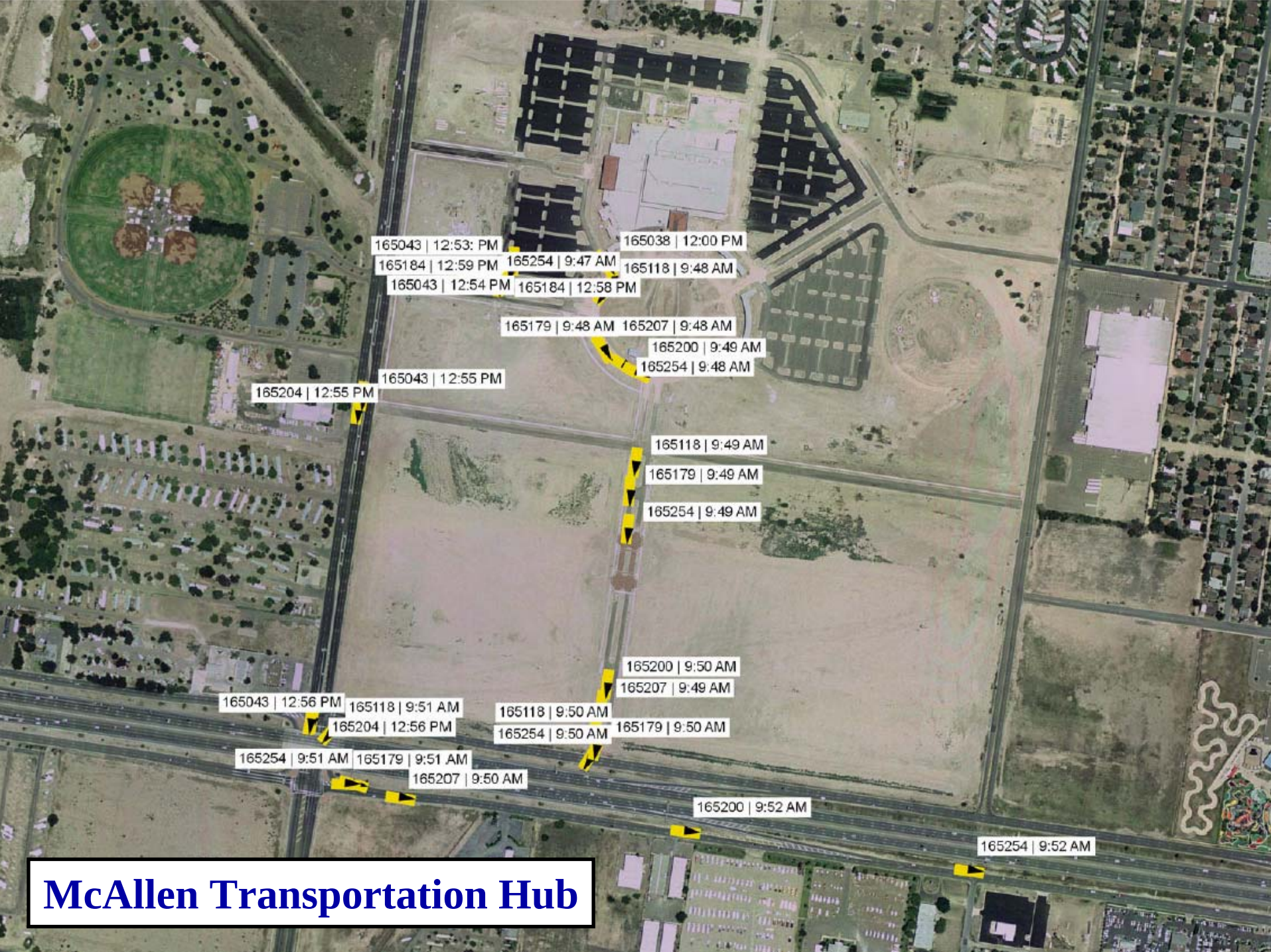
July 25, 2006

Forward Staging Areas

Tuesday, 08/21/2007 at 0900 CDT

Hurricane Dean: Alamodome Staging Area

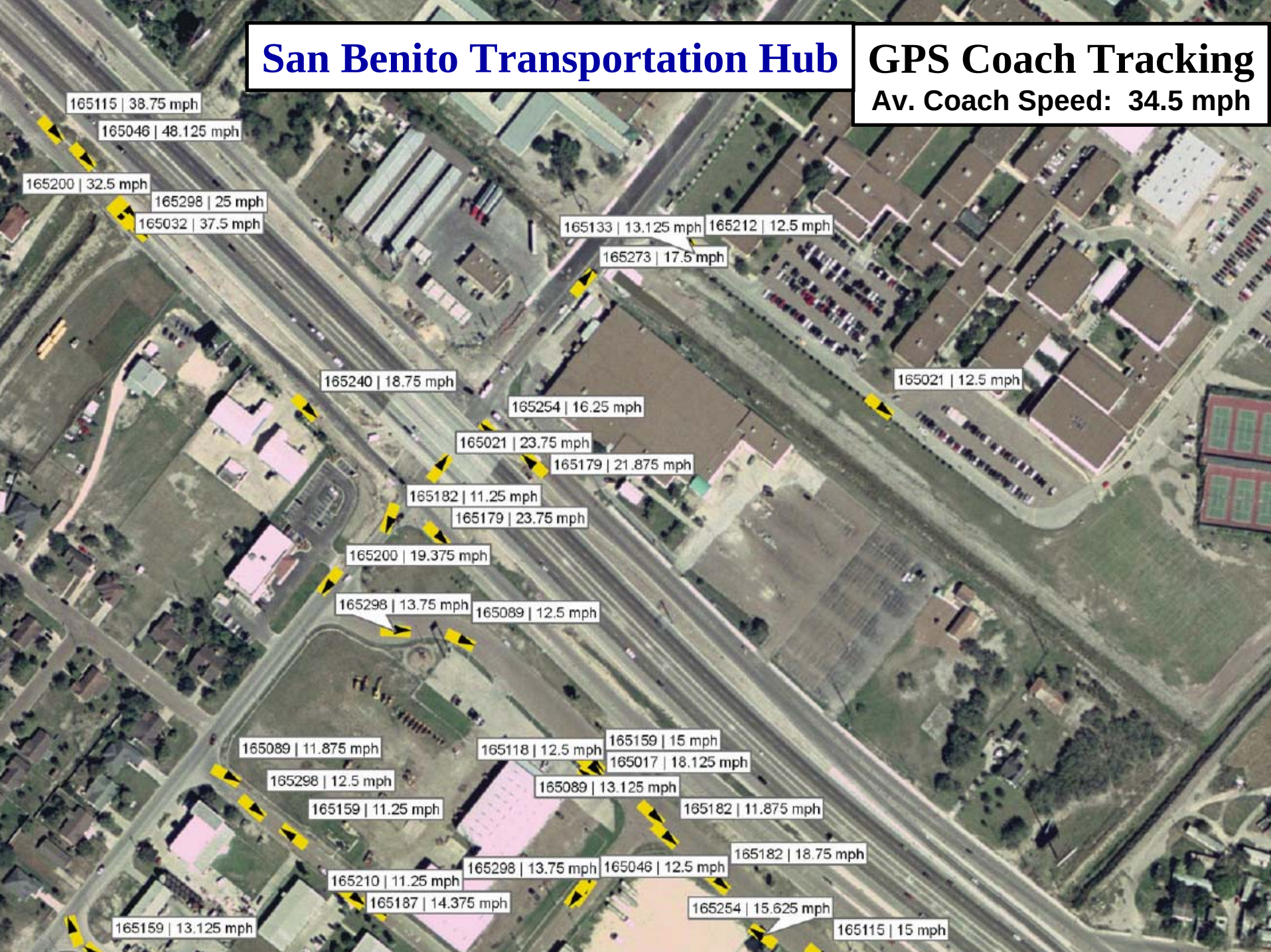
During the evacuation preparations for Hurricane Dean, hundreds of long-distance coaches and school buses traced the routes between San Antonio and the Lower Rio Grande Valley with real-time GPS locations transmitted to the State Operations Center in Austin.

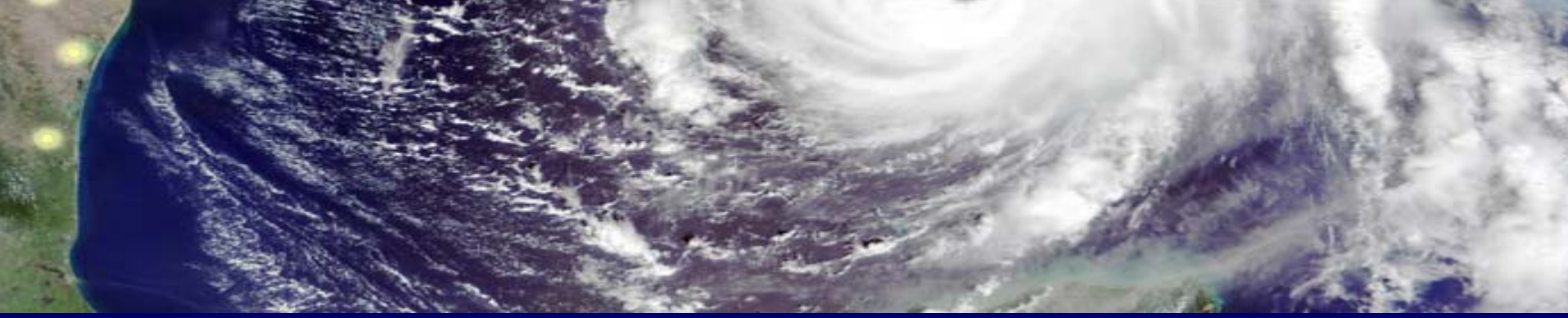

165043 | 12:53: PM
165038 | 12:00 PM
165184 | 12:59 PM
165254 | 9:47 AM
165118 | 9:48 AM
165043 | 12:54 PM
165184 | 12:58 PM
165179 | 9:48 AM
165207 | 9:48 AM
165200 | 9:49 AM
165254 | 9:48 AM
165043 | 12:55 PM
165204 | 12:55 PM
165118 | 9:49 AM
165179 | 9:49 AM
165254 | 9:49 AM
165200 | 9:50 AM
165207 | 9:49 AM
165043 | 12:56 PM
165118 | 9:51 AM
165118 | 9:50 AM
165204 | 12:56 PM
165254 | 9:50 AM
165179 | 9:50 AM
165254 | 9:51 AM
165179 | 9:51 AM
165207 | 9:50 AM
165200 | 9:52 AM
165254 | 9:52 AM
McAllen Transportation Hub

San Benito Transportation Hub

GPS Coach Tracking

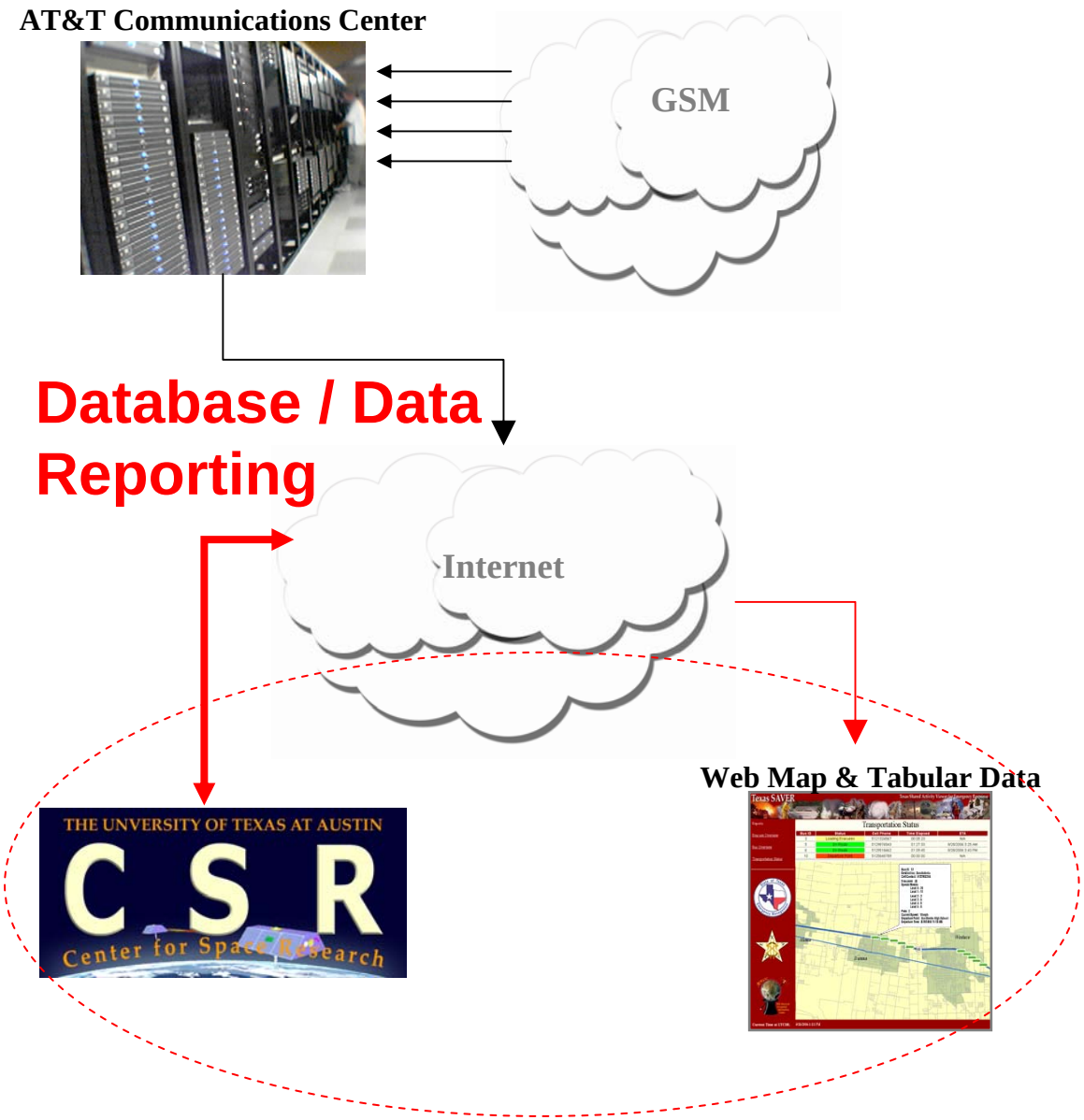
Av. Coach Speed: 34.5 mph





Database / Command & Control

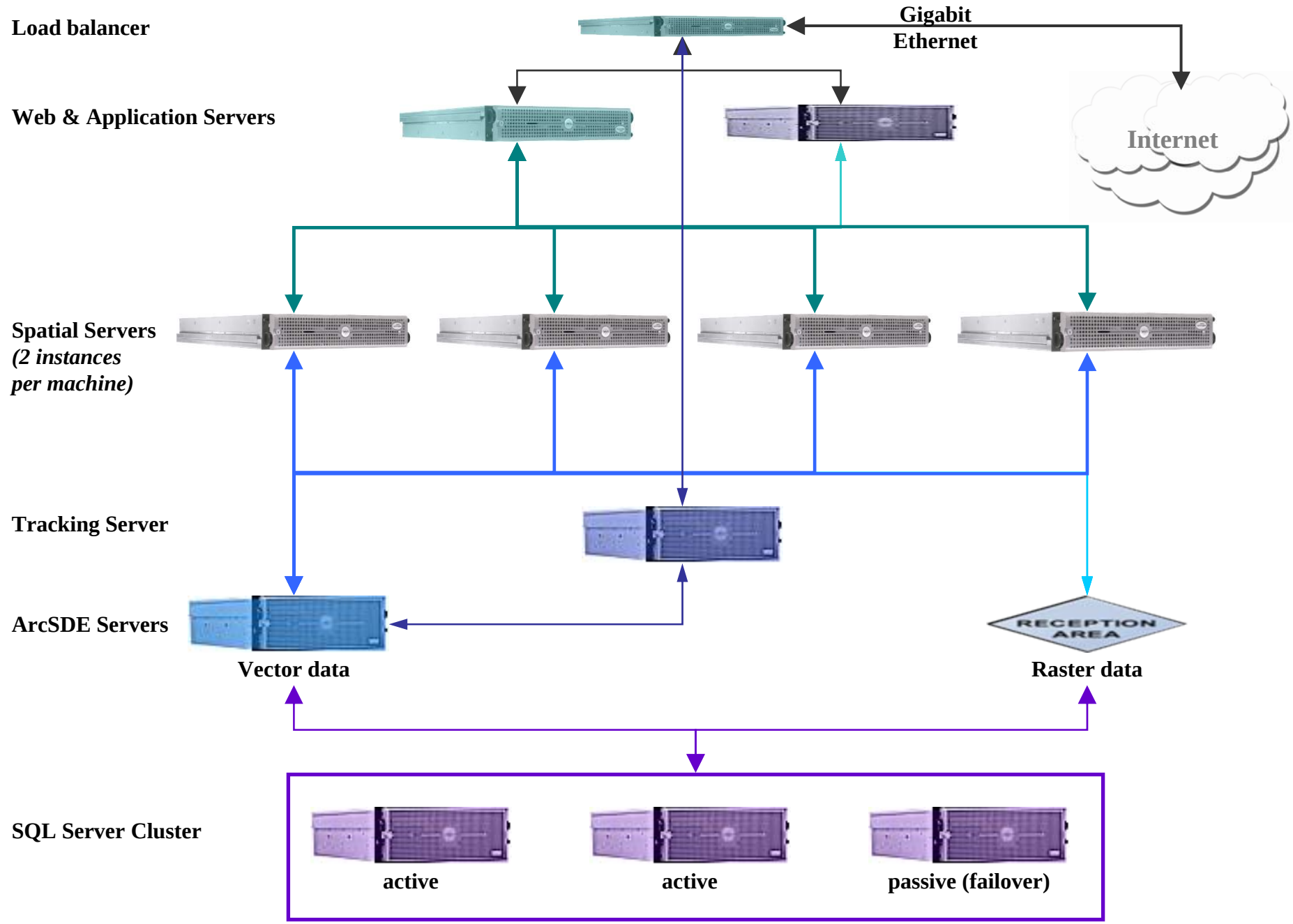
Tracking System Functions



Database Overview:

- High availability servers based at UT's Texas Advanced Computing Center
- ESRI Web Mapping servers integrating geospatial data
- Separate Web-based Command & Control displays for:
  - State Operations Center
  - Embarking Cities
  - Sheltering Cities

TRACKING SERVER ARCHITECTURE



Tracking System Functions

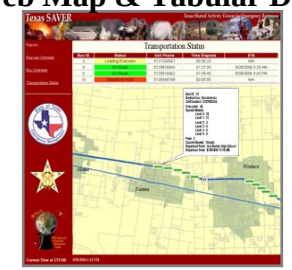
Communications

AT&T Communications Center

GSM

Internet

Web Map & Tabular Data



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Center for Space Research

Communications Overview:

- Laptop Wireless Data Cards
- Wireless data service in scanners at bus boarding, fuel stops and equipped shelters
- GPS devices equipped with wireless data service reporting at 30-second intervals
- Cell phones on GPS-equipped buses
- RFID Portals equipped with wireless data service

Texas SAVER

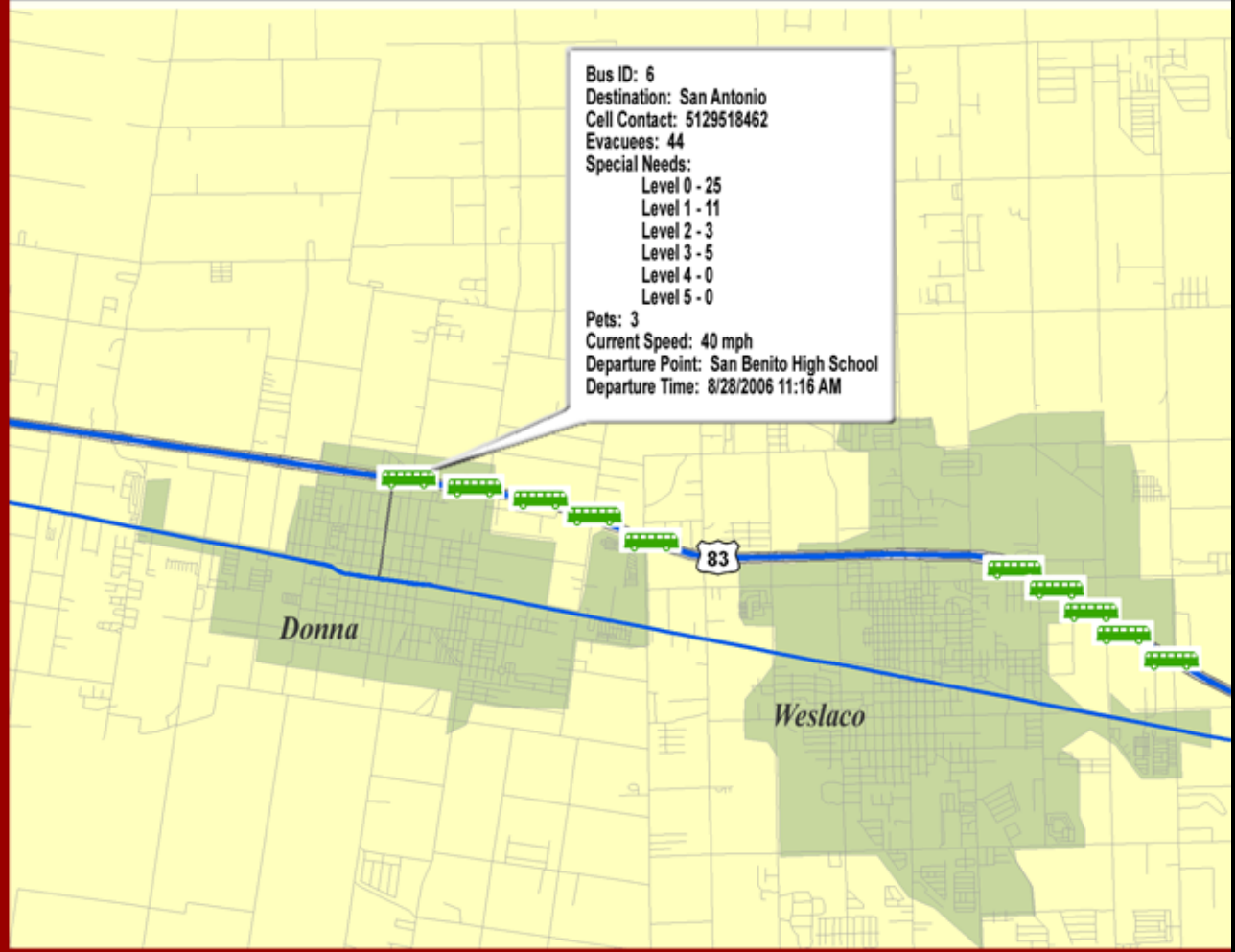
Texas Shared Activity Viewer for Emergency Response

Reports:

- Evacuee Overview
- Bus Overview
- Transportation Status

Transportation Status

Bus ID	Status	Cell Phone	Time Elapsed	ETA
3	Loading Evacuees	5121324567	00:05:23	N/A
5	En Route	5129876543	01:27:33	8/28/2006 3:25 AM
6	En Route	5129518462	01:09:45	8/28/2006 3:43 PM
10	Departure Point	5125648789	00:00:00	N/A



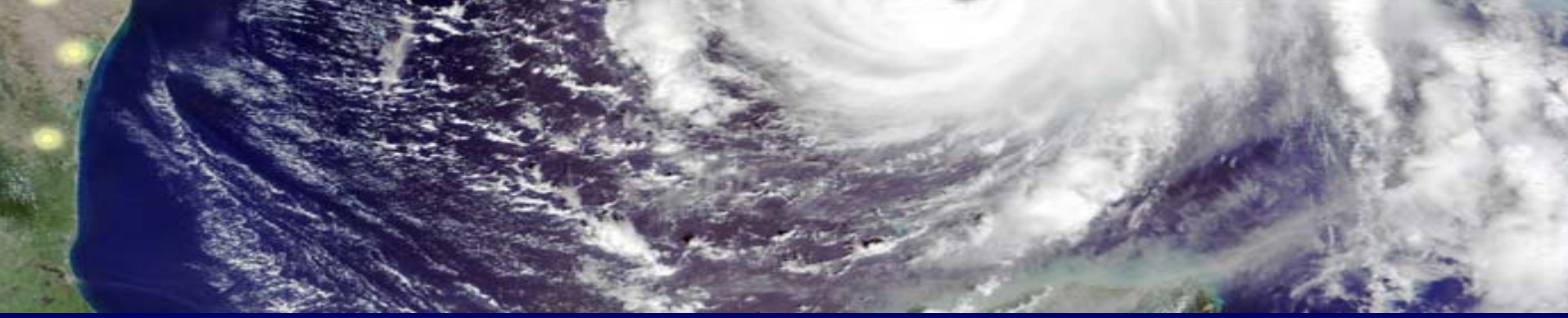
State of Texas Emergency Management

TEXAS

MAGIC

Mid-American Geospatial Information Center

Current Time at UTCSR: 8/28/2006 1:21 PM



Shelter Tracking

Tracking System Functions

AT&T Communications Center

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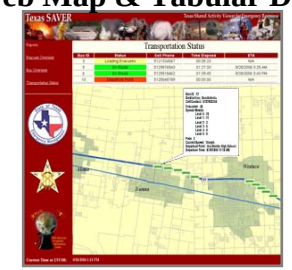
Internet

Web Map & Tabular Data



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Center for Space Research

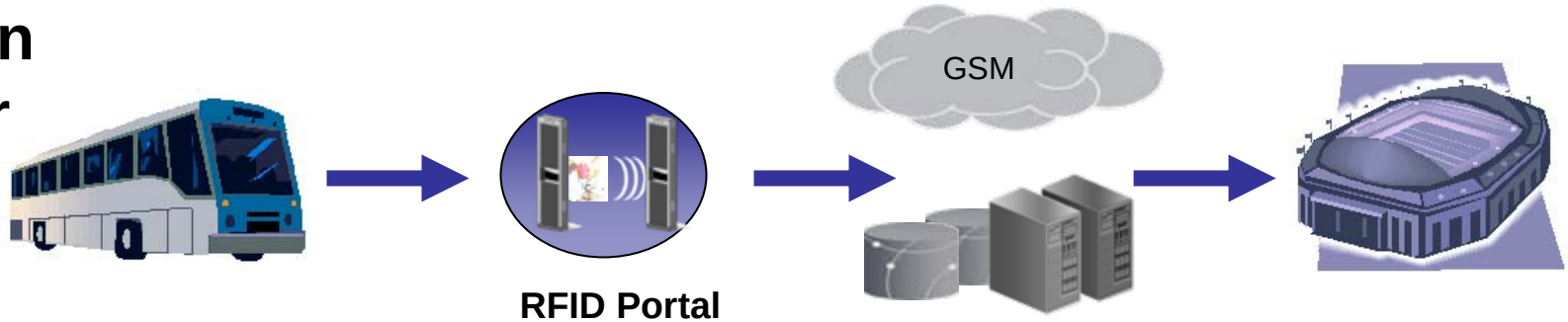
Shelter Tracking

Shelter Overview:

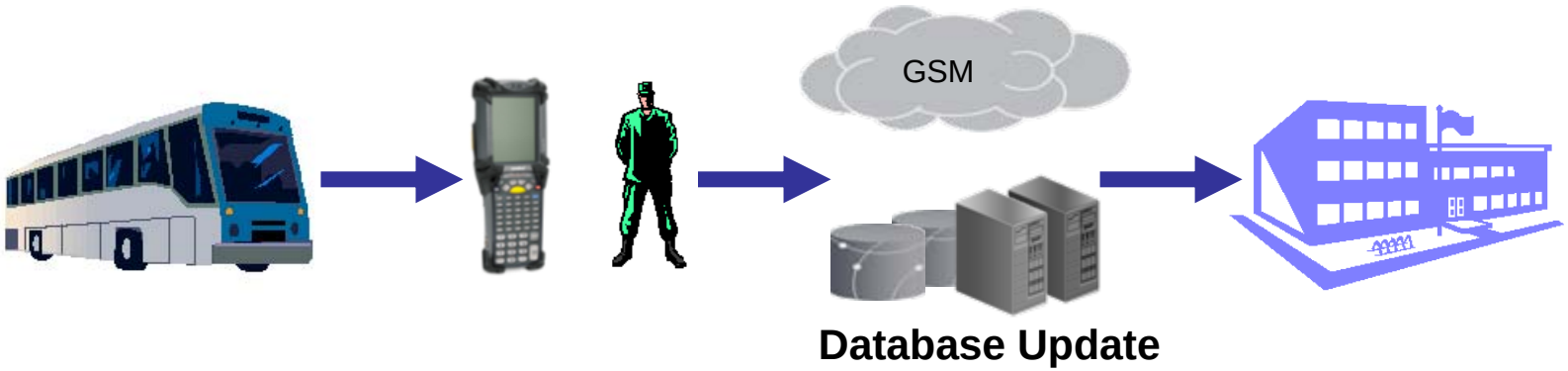
- RFID portals report arrival of evacuees quickly without the need to conduct individual scans when entering shelters
- Handheld scanners are used for small shelters
- Both portals and scanners send real-time updates to database via wireless network cards

Evacuee Processing at Shelters

Reception Center or Mega-Shelter

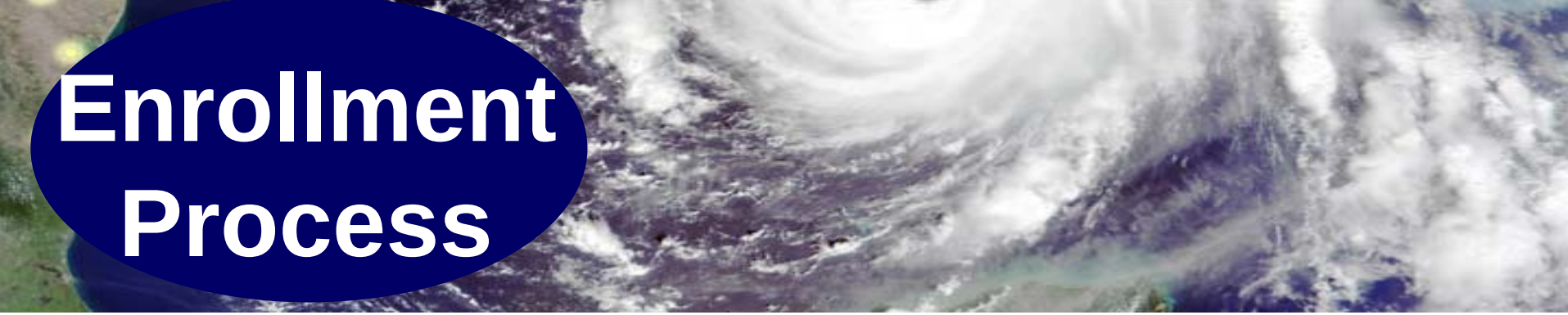


Small Shelter



Radiant Evacuation Portal

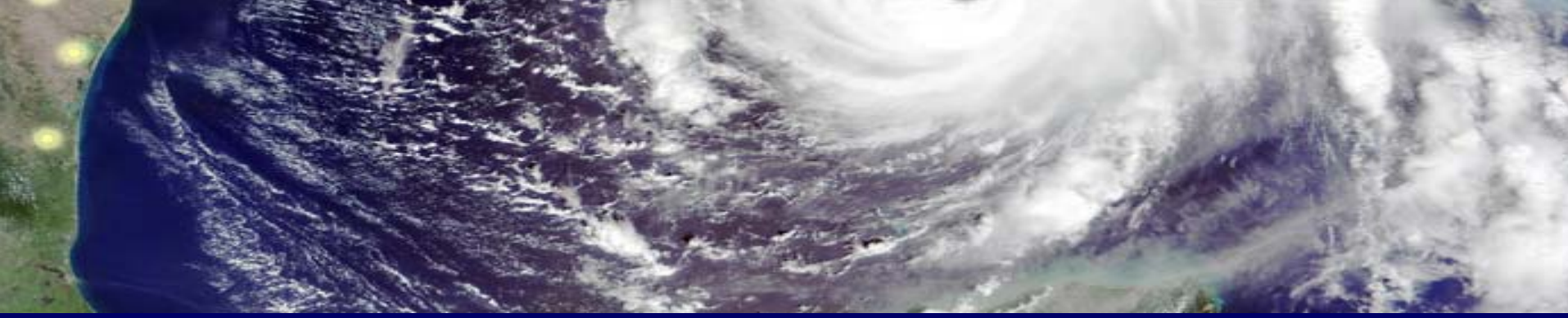
- High-read rate design
- Easily transportable
- Quick Set up
- Attractive Form Factor
- Versatile Connectivity
- Cellular
- Wi-Fi
- Wired Lan



Enrollment Process

RFID Overview:

- Eliminates lines – High flow portals (100 people per minute)
- Reduces resource requirements – no operators required
- Allows first responders to concentrate on crowd observation and control not scanning
- Passive logging of evacuee arrival and departure from shelters
- Portable – Self contained mobile system enables redeployment as needs change
- Wireless hands free operation
- Integrated – Fully integrated with UT System database



Summary Diagram

Tracking System Communications

Each convoy (coaches or school buses) will have at least one of the tracking devices. Location updates will be sent every 30 seconds.

GSM

AT&T Communications Center

Parameters captured:
Unit ID, Date, Time, Speed Lat, Lon

Evacuees will be registered → on site and issued a barcoded ID bracelet

Internet

National Guard will scan ID bracelets at boarding time, which will add the evacuees to the bus manifest→

Web Map & Tabular Data

Internet

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