Change Management Board Meeting

January 26, 2011

Video Conference: CO- Burns Video Bridge 3

Audio: 850 - 414 – 4660

Welcome and Call for Quorum

Eric Gordin, CMB Chairman

Agenda

Time	Item	Lead
1:30 - 1:35	Welcome and Call for Quorum	Eric Gordin
1:35 – 1:40	Previous Meeting Recap and Action Item Review	Eric Gordin
1:40 – 1:45	New CMB Member: L.A. Griffin, OOCEA	Eric Gordin
1:45 – 1:50	FMT / ITS WAN Update	Frank Deasy
1:50 – 2:10	IntelliDrive	Tucker Brown
2:10 – 2:30	Color DMS	Robert Heller
2:30 – 3:00	OOCEA Proposed Enhancements ***(Vote)***	John Hope
2:30 – 3:20	H.264 Driver	Bill Wolff

Agenda (cont')

Time	Item	Lead
3:20 – 3:35	MIMS *(Vote)*	Krishnamurthy and Barbosa
3:35 – 3:50	Camera Images on SunGuide Map *(Vote)*	Clay Packard
3:50 – 4:20	SunGuide Database	Steve Novosad
4:20 – 4:30	Action Items Review	Eric Gordin

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Previous Meetings Recap and Action Items Review

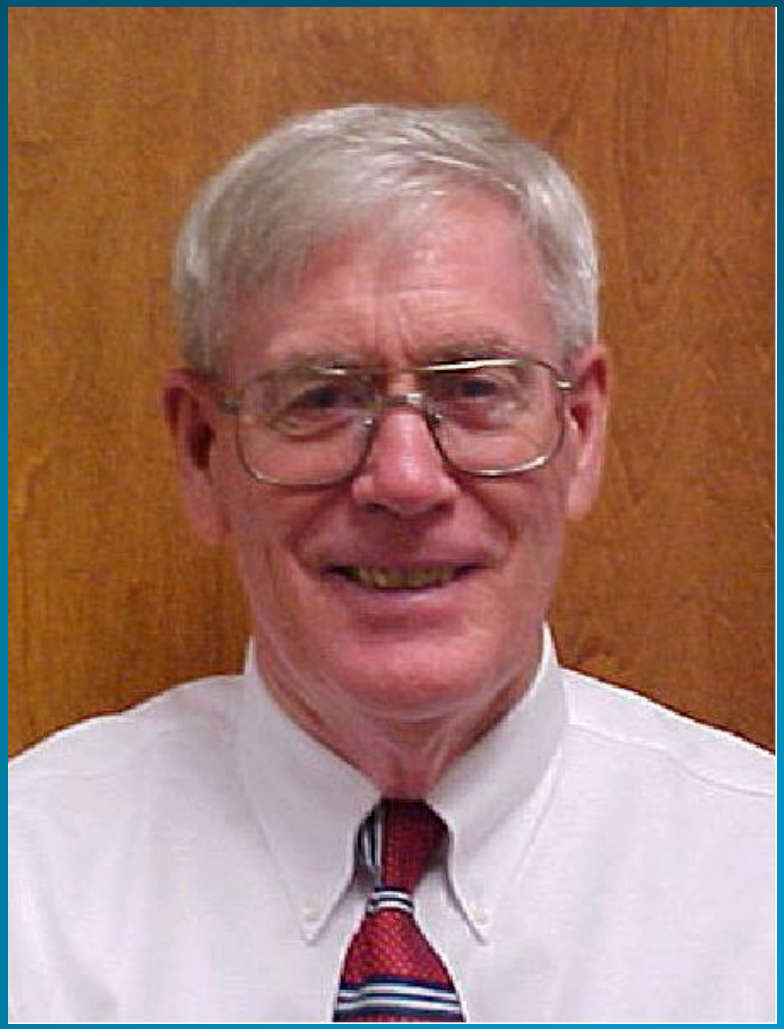
Eric Gordin

October 19 – CMB Action Items

1. CO to add fourth criteria to CMB voting member criteria: "Public Agency within the State of Florida" and distribute.
2. Arun Krishnamurthy to forward unapproved words on DMS cost estimate to CMB.
3. SwRI to describe FL-ATIS dashboard existing Web server / interface; SwRI to work with CO to fine-tune for next CMB meeting.
4. A. Krishnamurthy to send list of Footprint issues that have been approved to CMB.
5. SwRI to develop H.264 Whitepaper.

New CMB Member

- L. A. Griffin
- Manager of Expressway Operations
- Orlando-Orange County Expressway Authority



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ITS Telecommunications Update

Randy Pierce &
Frank Deasy

ITS WAN Update - The Present

- **Which District ITS Networks are online?**
  - D2 RTMC, Jacksonville
  - D4 RTMC, Ft. Lauderdale
  - D5 RTMC, Orlando
  - D6 RTMC, Miami
  - TERL Test-Bed TMC, Tallahassee
- **What is currently supported?**
  - SunGuide center-to-center features.
  - FHP CAD data.
  - Video sharing.
  - Any and all IP-based interdistrict ITS traffic.

ITS WAN Update-The Future

- FTE RTMCs, Pompano and Turkey Lake
  - Equipment installed at Pompano RTMC.
  - Next Step: Configuration and connection to FTE switch.
  - Installation/testing estimated March 2011.
- D7 RTMC, Tampa
  - Equipment currently active at Qwest staging site, Orlando.
  - Fiber path is available.
  - Next Step: Fiber testing and characterization;
  - If test results OK then...
  - Installation/testing estimated March 2011.
- D1 RTMC, Ft. Myers
  - Equipment currently active at Qwest staging site.
  - Next Step: Resolve east-end fiber path issues.
  - Fiber testing and characterization;
  - If test results OK then...
  - Installation/testing estimated March/April 2011.
- D3 RTMCs, Pensacola and Tallahassee
  - Currently in planning/design stage
  - Will use FDOT microwave system.

ITS Facility Management System Central Office Activities

- Develop Scope for ITSFM Application Upgrades
  - Standard Reports
  - Functionality Upgrades
  - Performance Upgrades
  - Update ITSFM Code Lists

ITS Facility Management System Central Office Activities

- Develop Language to be included in New Contracts for the Data Collection & Encoding of New Facilities by Contractors
- Develop Automated Tools to Expedite Encoding
- Develop User Training Material and Course for Managers, Engineers and Technicians
- Develop User Encoding Material and Training Course
- Perform Encoding Training for High-Speed Rail Contractors

ITS Facility Management System District Training

TASK	DISTRICT							
	1	2	3	4	5	6	7	FTE
Data Collection Training	X	X					X	
GPS Survey of Training Area	X	X				X	X	X
Cabinet Inventory of Training Area	X	X					X	X
Encode Training Data into ITSFM	X							
Issue Contract Language								
Conduct User Training								
Conduct Encoder Training								

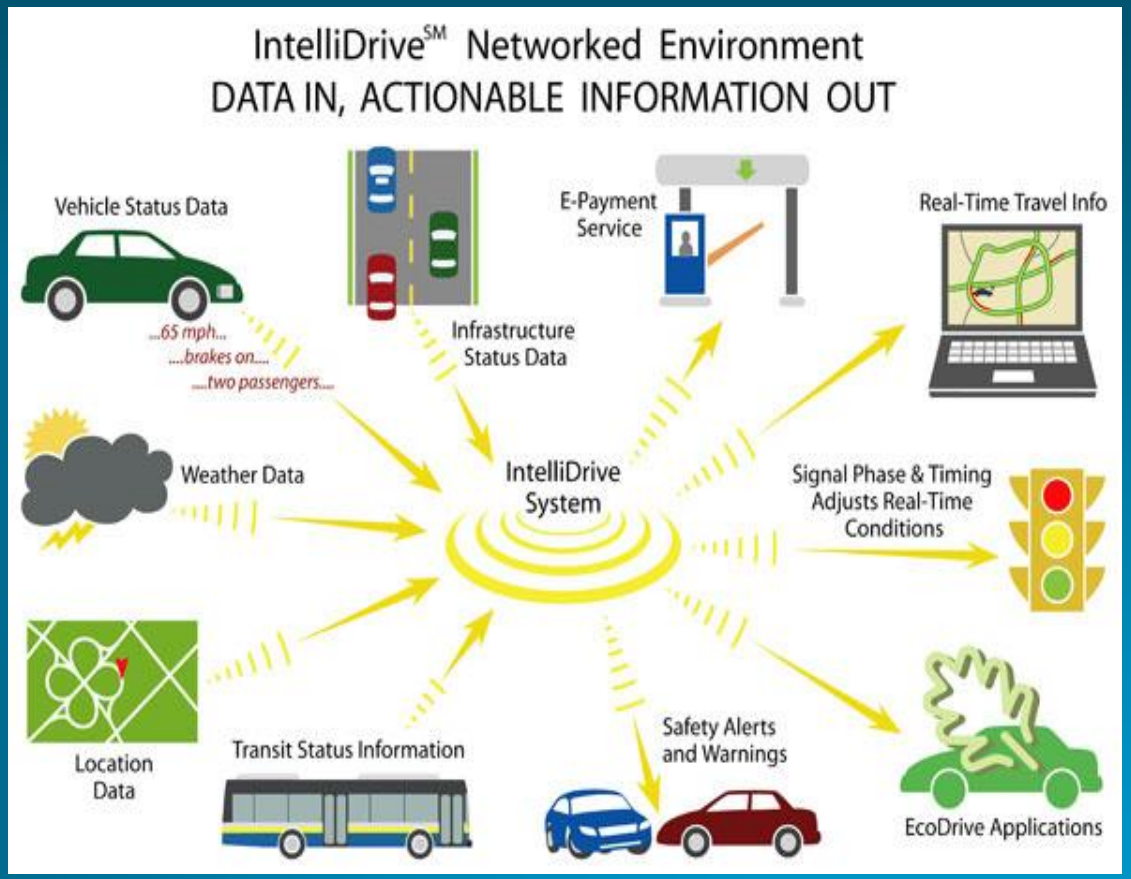
Change Management Board

IntelliDrive Enhancement

Tucker Brown

What is IntelliDrive?

- USDOT sponsored initiative
  - Wireless networked communication between
    - Vehicles
    - Infrastructure
    - Passengers personal communication devices



IntelliDrive Goals: Safety

- 360° awareness to alert driver of dangers
  - Blind spots
  - Forward Collision Warning
  - Electronic Emergency Brake Lights
  - Intersection Movement Assist
  - Do Not Pass Warnings
  - School Zones
  - Weather
  - Construction

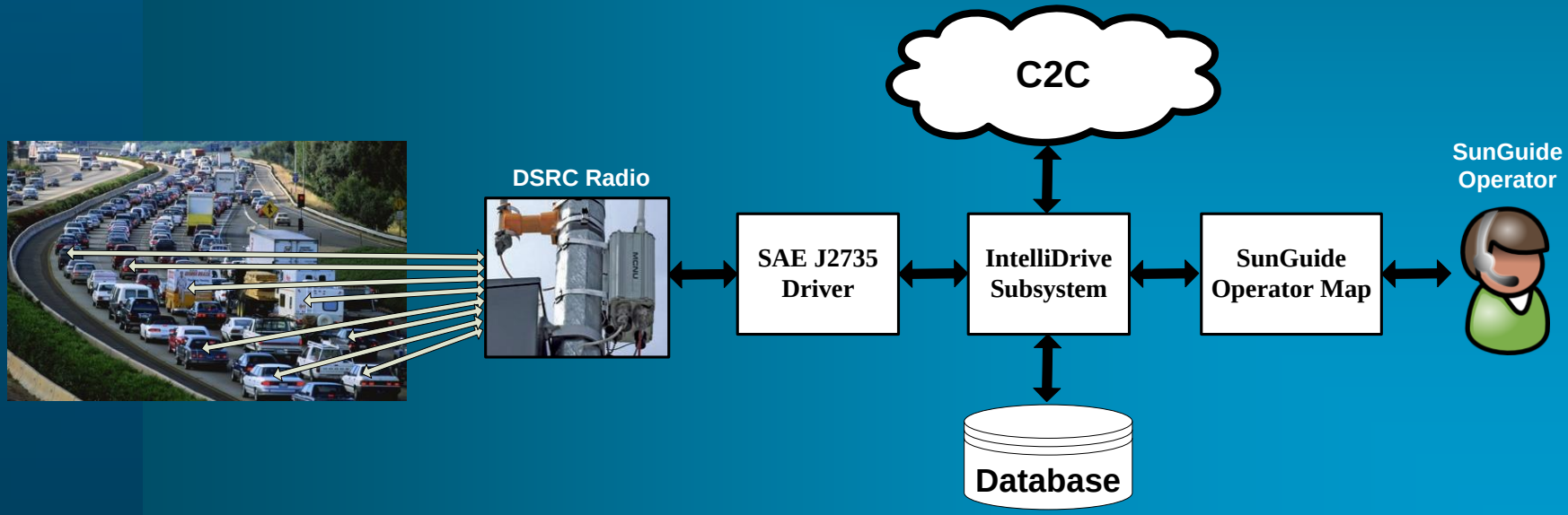
IntelliDrive Goals: Traffic Mgmt and Environmental

- Traffic Mgmt Performance
  - Adjust traffic lights based on traffic patterns
  - Alert emergency services when an accident occurs

- Environmental Impact / Convenience
  - Real-time suggestion of alternate routes reduces
    - Stopping
    - Travel times

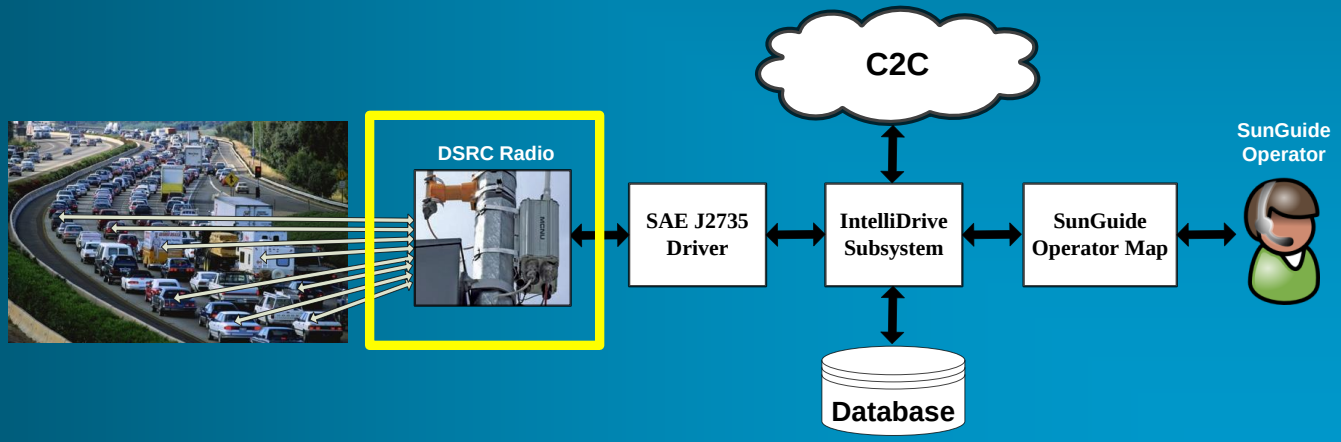
What Are We Enhancing?

- Deployment of Roadside Equipment
- Integrate IntelliDrive functionality into SunGuide
  - Make IntelliDrive and SunGuide data available to demonstrators



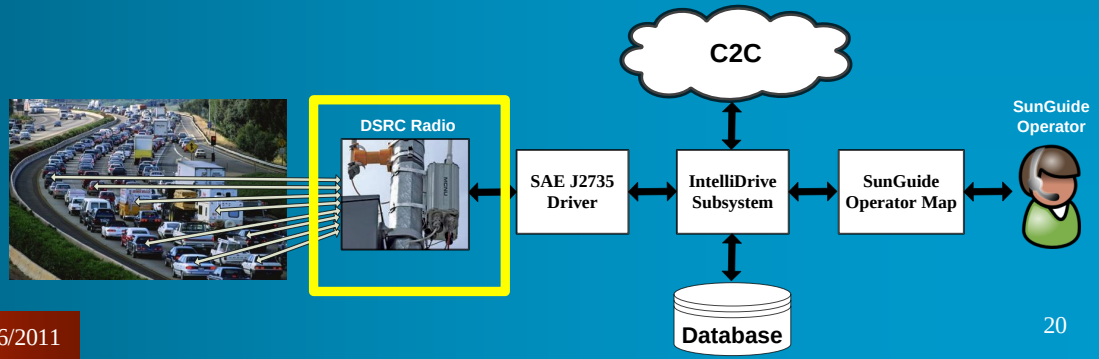
RSE: Basic Safety Message (BSM)

- Current traffic probes collect speed data
- Cars will transmit the BSM continuously at 10 Hz
  - Latitude, Longitude
  - Heading
  - Speed
- Turns vehicles into probes



RSE:
Probe Vehicle Data Message (PVDM)

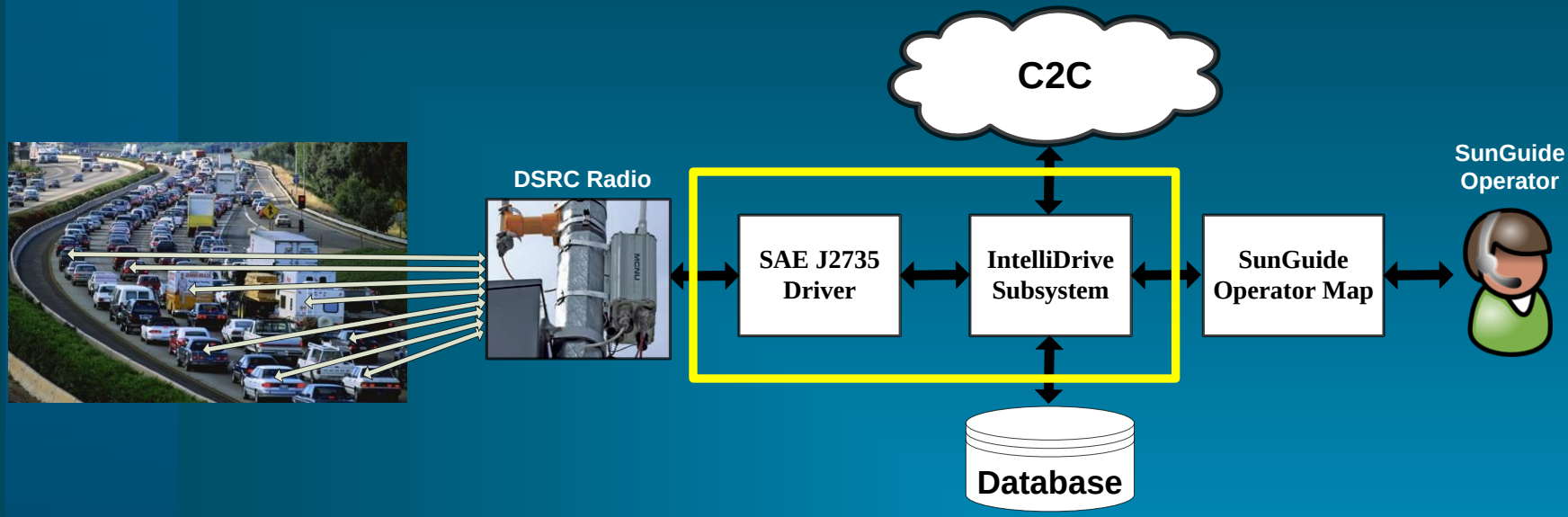
- Contains all data from BSM
- Cars will transmit PVDM
  - 120+ Data Points
  - Examples
    - Wiper Status
    - Brake Status
    - Stability Control Status
- Data Points for demonstration determined at later review



RSE:
Traveler Advisory Message (TAM)

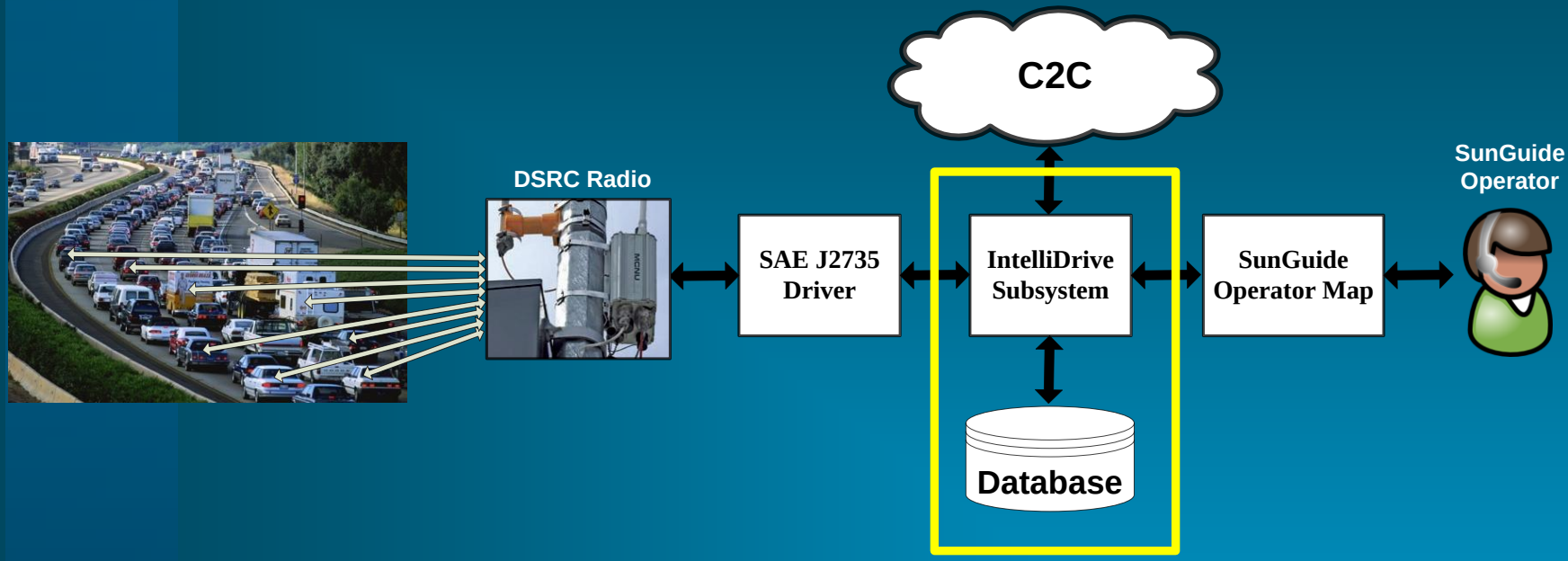
- Generated at the TMC
- Messages meant specifically to driver
  - Contains area that in-car device should display message (presentation region)
- Up to in-car device to determine how the message is displayed to the driver

New SunGuide Subsystem



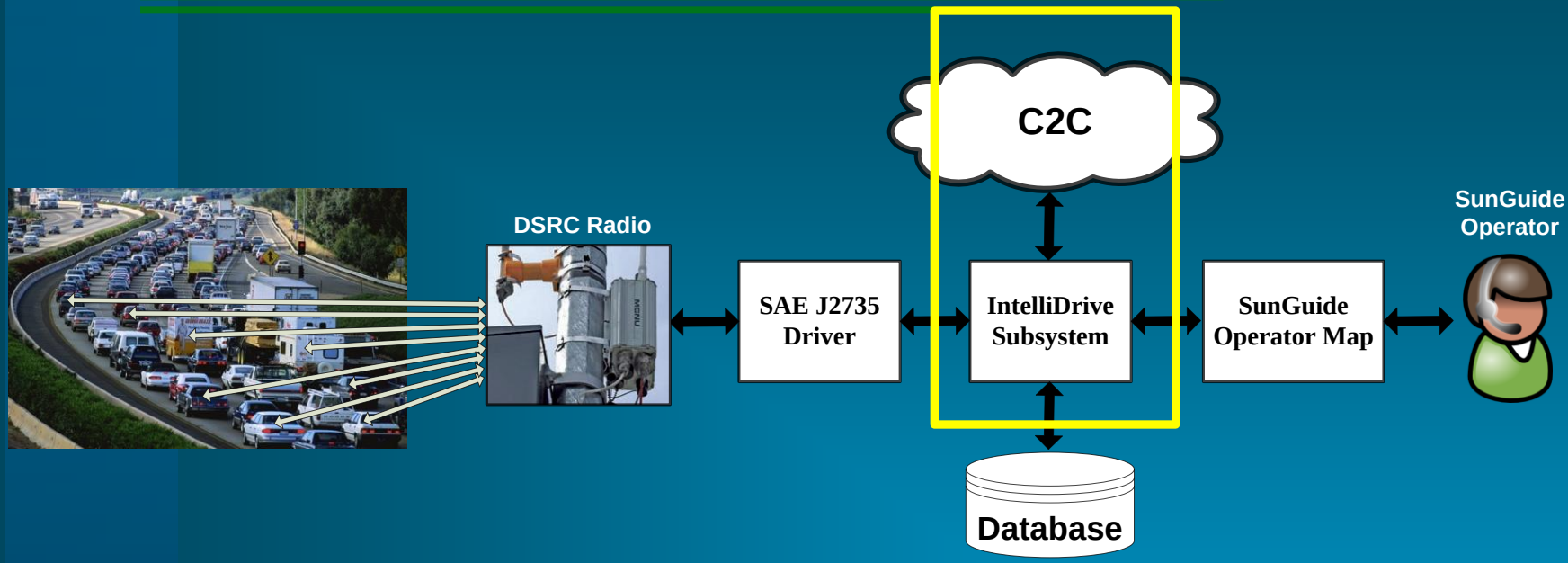
- RSEs will implement the SAE J2735 Standard
- Speed data will collected, averaged, and reported
- Data representation of other data types will be decided later

SunGuide Database Logging



- PVDM and TAM messages will be logged
- Information can be provided for research or reports

SunGuide Center to Center



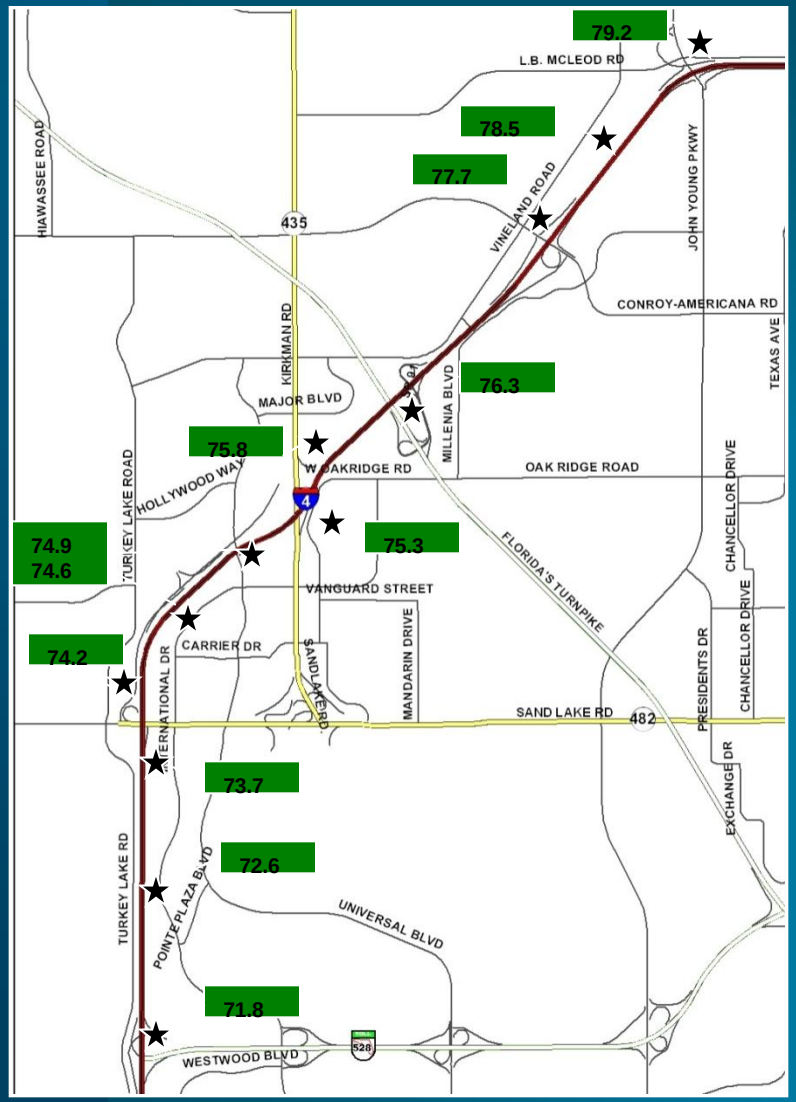
- Provide demonstrators with IntelliDrive data
- Provide demonstrators with SunGuide data
  - Real-time traffic data
  - DMS status
  - Travel-time data

SunGuide Map Changes

- Icon for RSE devices
  - Pop up dialog for viewing IntelliDrive data

- Pop up editor for sending TAMs to drivers
  - Select presentation area (area where vehicles should display a message to the driver)
  - Select RSEs to send to
  - Input desired message
  - Also included as part of a response plan

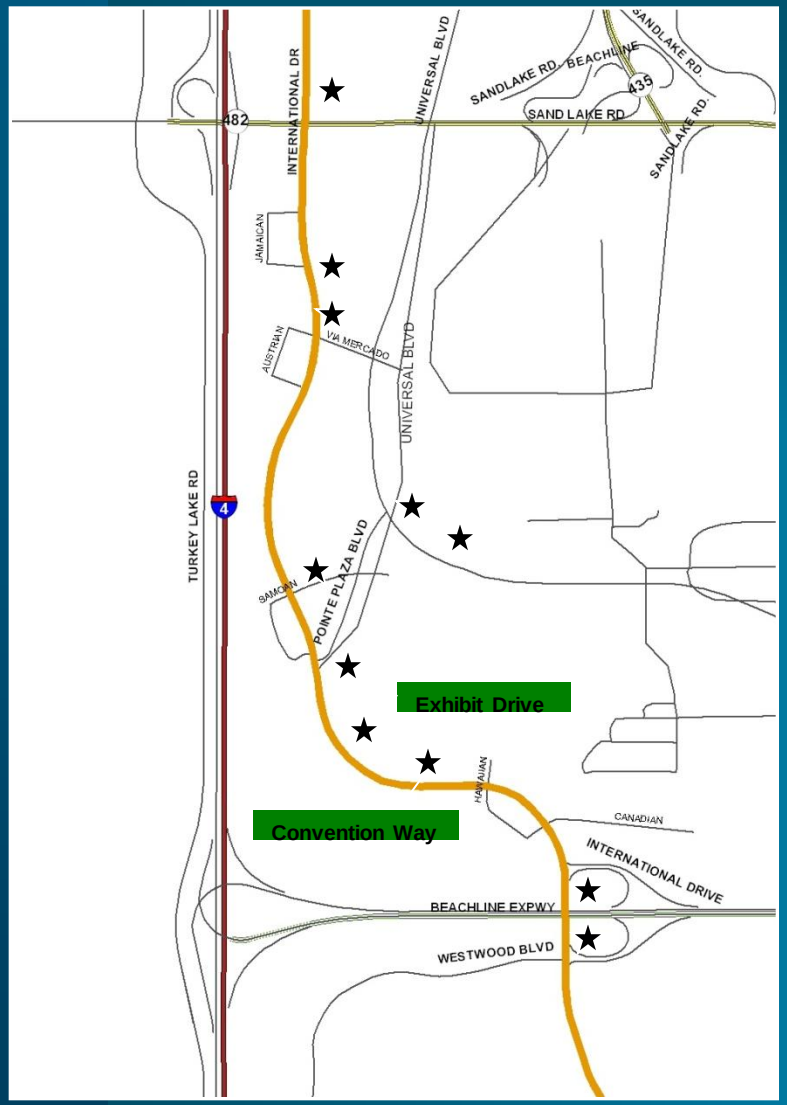
RSE Locations



11 RSEs

- MM 78.5
- MM 77.7
- MM 76.3
- MM 75.8
- MM 75.3
- MM 74.9
- MM 74.6
- MM 74.2
- MM 73.7
- MM 72.6
- MM 71.8

RSE Locations



11 RSEs

International Drive

- SR 482
- Jamaican Court (South)
- Via Mercado
- Samoan Court
- Universal Boulevard
- Exhibit Drive
- Convention Way
- SR 528 Westbound
- SR 528 Eastbound

Universal Boulevard

- Pointe Plaza Blvd (Siemens)
- Convention Way (Siemens)

Estimated Cost

- **Total Estimated Cost**
  - **$483,655**

Change Management Board

Color DMS

Robert Heller

Background

- District 5 and MDX have expressed interest in Color DMS
  - NTCIP 1203 v2 introduces color
  - NTCIP 1203 v3 adds testing, but no additional functionality
- SunGuide supports
  - NTCIP 1203 v1.03 (1997)
- Sources of information
  - University of Rhode Island Study in 2006
  - MUTCD recommendations DMS color use
  - http://www.daktronics.com

Sign Capability

- Typical geometries (5 x 7 pixels character)
  - 27 or 36 rows of pixels (3 or 4 character lines)
  - 75 to 125 columns (12 to 21 characters / line)

- Full matrix or line matrix

MUTCD DMS Color Use

Type of Sign	Legend						Background		
	Red	White	Yellow	Orange	Fluorescent Yellow-Green	Fluorescent Pink	Black	Blue	Green
Changeable Message Signs									
Regulatory	X	X					X		
Warning			X				X		
Temporary Traffic Control			X	X			X		
Guide		X					X		X
Motorist Services		X					X	X	
Incident Management			X			X	X		
School, Pedestrian, Bicycle			X		X		X		

Color Use Examples:

- Display the current roadway shield in travel time messages *

* graphic is from http://www.Daktronics.com

Examples (continued)

- Use graphic symbol to provide visual reference for message*

* graphic is from http://www.Daktronics.com

U. Rhode Island Study

- 2006, "Employing Graphics to Aid Message Display on Dynamic Message Signs"
  - Focus on color readability
  - Does graphics help?

- Study results
  - Preference on use of graphics v all text
  - One large graphic to left of message vs graphic on right or multiple images
  - Use of standard diamond rather than circular, square, or other non-framed images
  - Enhanced sign recognition times.

SunGuide Modifications

- User Interface
  - Message editor modified for color and graphics
  - Graphic image management
  - No graphic image editing within the GUI.
- DMS Driver
  - Add support NTCIP v2 and v3
  - Continue NTCIP v1, Mark IV, etc
- RPG message generation
  - Roadway shield placement
  - Other icons depending on message (event) type

Recommendation

- Phase 1:
  - Update DMS driver to support NTCIP v2 and v3 (Select OIDs, new FDOT MIB)
  - Update RPG for reassurance shield on travel time messages
  - GUI update for graphic image display

- Phase 2
  - Define other graphic use for event / weather / construction / lane closures, etc.

Change Management Board

OOCEA Proposed Enhancements

John Hope

OOCEA Proposed Enhancements

- Additional TSS Alerting
  - Traffic Detector Failure Email Alerts
    - Sends email upon detector failure
  - System-wide Traffic Detector Failure Email Alerts
    - Sends email if % of detectors fail
  - Invalid Traffic Detector Data Email Alerts
    - Detects if detector data is invalid per lane
    - Sends email if invalid data detected, indicating which detector, link, and lane violated thresholds

Additional TSS Alerting Reqs,1

Req ID	Requirement
AlertA	The software shall be able to send Traffic Detector Failure alerts.
AlertA1	When a traffic detector's operational status changes to the failed state and remains there at least as long as the Traffic Detector Failure alert delay period, the software shall send a Traffic Detector Failure alert via email to users with permission to receive these alerts.
AlertA2	Traffic Detector Failure alerts shall contain the detector and the time the detector entered the failed state.
AlertA3	Traffic Detector Failure alerts shall be logged in the Status Logger.
AlertB	The software shall be able to send System-wide Traffic Detector Failure alerts.
AlertB1	The SunGuide configuration file shall contain configurable value for the threshold of a System-wide Traffic Detector Failure alert, stored as a percentage.
AlertB2	When the percentage of traffic detectors with a failed operational state exceeds the threshold configured in the SunGuide configuration file and remains above the threshold at least as long as the Traffic Detector Failure alert delay period, the software shall send a System-wide Traffic Detector Failure alert email to users with permission to receive these alerts.
AlertB3	When the percentage of traffic detectors with a failed operational state exceeds the threshold configured in the SunGuide configuration file and remains above the threshold at least as long as the System-wide Traffic Detector Failure alert delay period, the software shall send a System-wide Traffic Detector Failure alert to logged-in users with permission to receive these alerts.
AlertB4	The System-wide Traffic Detector Failure alert shall be presented to users in the System Messages dialog.
AlertB5	System-wide Traffic Detector Failure alerts shall be logged in the Status Logger.
AlertC	The software shall be able to send Invalid Detector Data alerts.
AlertC1	From the SunGuide Admin Editor, an authorized user will be able to configure a set of timed thresholds for all detectors for generating Invalid Detector Data alerts.
AlertC1.1	An Invalid Detector Data alert threshold shall consist of a start time of day, an end time of day, and minimum and maximum Speed, Occupancy, and Volume values.

Additional TSS Alerting Reqs,2

Req ID	Requirement
AlertC1.2	The software shall not allow a user to create or modify an Invalid Detector Data alert threshold if it would overlap with the time range defined by another existing threshold.
AlertC2	The software shall generate an Invalid Detector Data alert when it detects an invalid detector data condition.
AlertC2.1	A threshold shall be considered in effect if the current time of day is greater than or equal to the start time of the threshold and is less than the end time of the threshold.
AlertC2.2	A lane shall be considered to be reporting invalid data if that lane's reported speed, occupancy, or volume are outside the bounds of the effective threshold for the current time of day.
AlertC2.3	If a lane reports invalid data for at least as long as the Invalid Detector Data alert delay period, the software shall send an Invalid Detector Data alert via email to users with permission to receive these alerts.
AlertC3	Invalid Detector Data alerts shall contain the detector, link, and lane that generated the alert.
AlertC4	Invalid Detector Data alerts shall be logged in the Status Logger.
AlertD	Traffic Detector Failure, System-wide Traffic Detector Failure, and Invalid Detector Data alerts shall delay generation of the alert based on a delay threshold.
AlertD1	The delay threshold shall be the number of minutes the conditions generating the alert shall be present before and alert is generated.
AlertD1.1	A delay threshold for Traffic Detector Failure alerts shall be configurable in the SunGuide Configuration file.
AlertD1.2	A delay threshold for System-wide Traffic Detector Failure alerts shall be configurable in the SunGuide Configuration file.
AlertD1.3	A delay threshold for Invalid Detector Data alerts shall be configurable in the SunGuide Configuration file.
AlertD2	The software shall not send a new Traffic Detector Failure, System-wide Traffic Detector Failure, or Invalid Traffic Detector Data alerts until the conditions that caused the alert no longer exist for a period of time equal to the delay threshold corresponding to the alert type.

OOCEA Proposed Enhancements

- Wavetronix SmartSensor 125 HD Enhancements
  - SmartSensor 125 HD Device Driver
  - Read and archive up to 10 lanes of travel
  - Read and archive 8 different vehicle classifications
  - Addition of Vehicle Counts by Classification report

Wavetronix SmartSensor 125 HD Enhancements

Req ID	Requirement
HD001	The software shall support the Wavetronix Smart Sensor 125 HD.
HD002	The software shall support the use of the Wavetronix Smart Sensor 125 HD based on the protocol described in the "SmartSensor HD Released Communication Protocols" created on 5/31/2006 and edited last edited on 2/25/2008 (*the document listed in the requirement may be changed but must be specified before development begins)
HD003	The software shall support the reporting of speed, volume, and occupancy by lane, when available, for at least 10 lanes from a single detector.
HD004	The TSS Link Data status dialog shall support the reporting of speed, volume, and occupancy for at least 10 lanes of travel from a single TSS link.
HD005	SunGuide shall support archive speed, volume, and occupancy by lane for at least 10 lanes of a TSS link.
HD006	The software shall support the reporting of up to 8 different vehicle classifications from a single detector.
HD007	The software shall archive up to 8 different vehicle classifications for a single detector.

Estimated Costs (Vote)

- Additional TSS Alerting
  - $23,250
- Wavetronix SmartSensor 125 HD Enhancements
  - $41,000

- Total Estimated Cost
  - $64,250

Vote

Change Management Board

Video Switching Protocols (H.264 Driver)

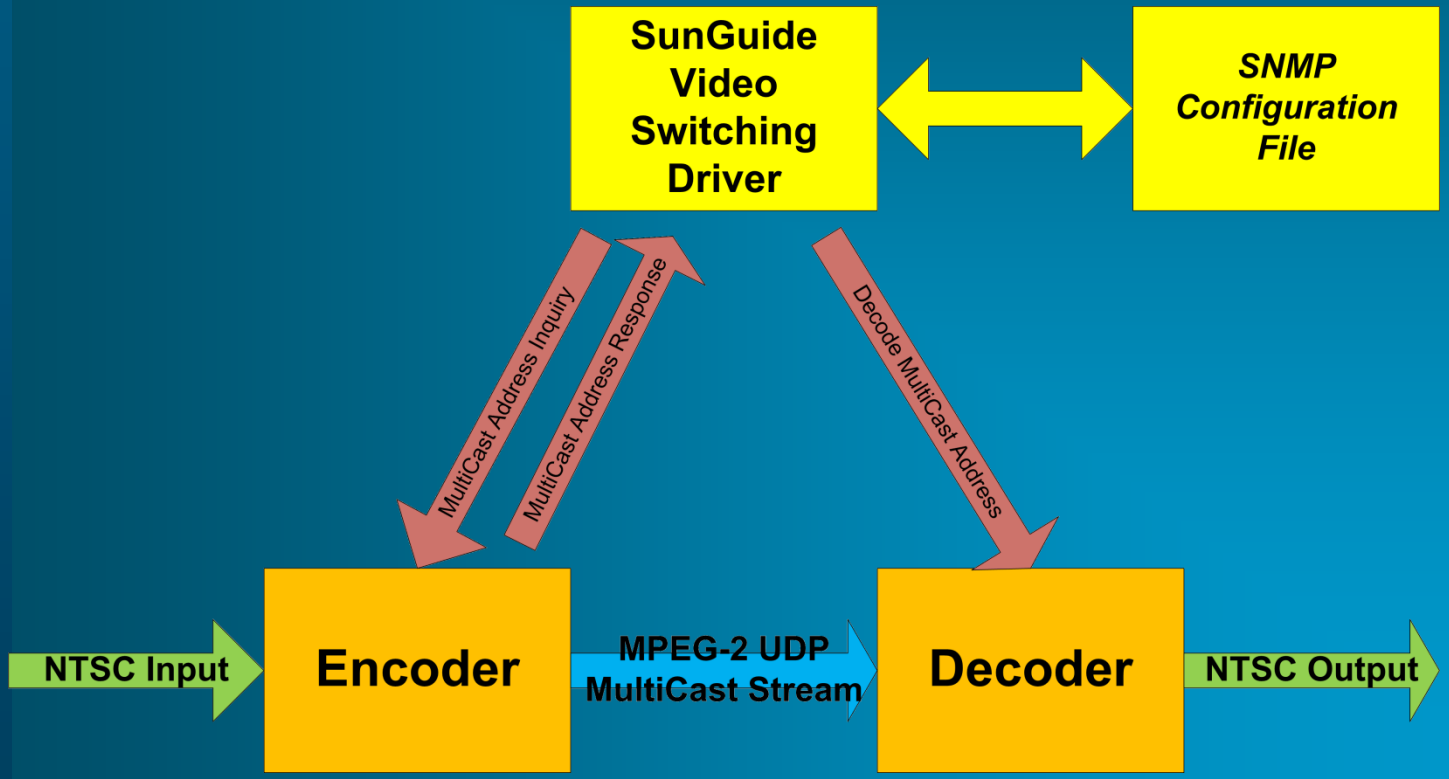
Bill Wolff

SunGuide Video Support

- Moving Pictures Expert Group-2 (MPEG-2) encoded video.
- American Dynamics, Cohu, and Vicon analog cameras.
- NTCIP and American Dynamics protocols for Closed Circuit Television (CCTV) control.
- Video switching using Coretec, Cornet, Impath, Teleste, and VBrick IP CODECs.
- Barco video wall control.
- Serial and Ethernet connectivity depending on device.
- Simple Network Management Protocol (SNMP) used for command and control of some devices.

Current SunGuide Video Switching

- Decoder / Encoder management is SNMP
- Broadcast stream is MPEG-2



IP Video General Standards

- Encoding
  - MPEG-2
  - MPEG-4
  - H.264
- Switching
  - RTP / RTSP / SDP / SAP
  - ISMA

Traffic Surveillance

- NTCIP Standards
  - NTCIP 1205 Camera control
  - NTCIP 1208 Analog Video Switching

Physical Security Industry

- ONVIF
  - PTZ camera control (no iris, focus, alarms, etc.)
  - Decoder / encoder management

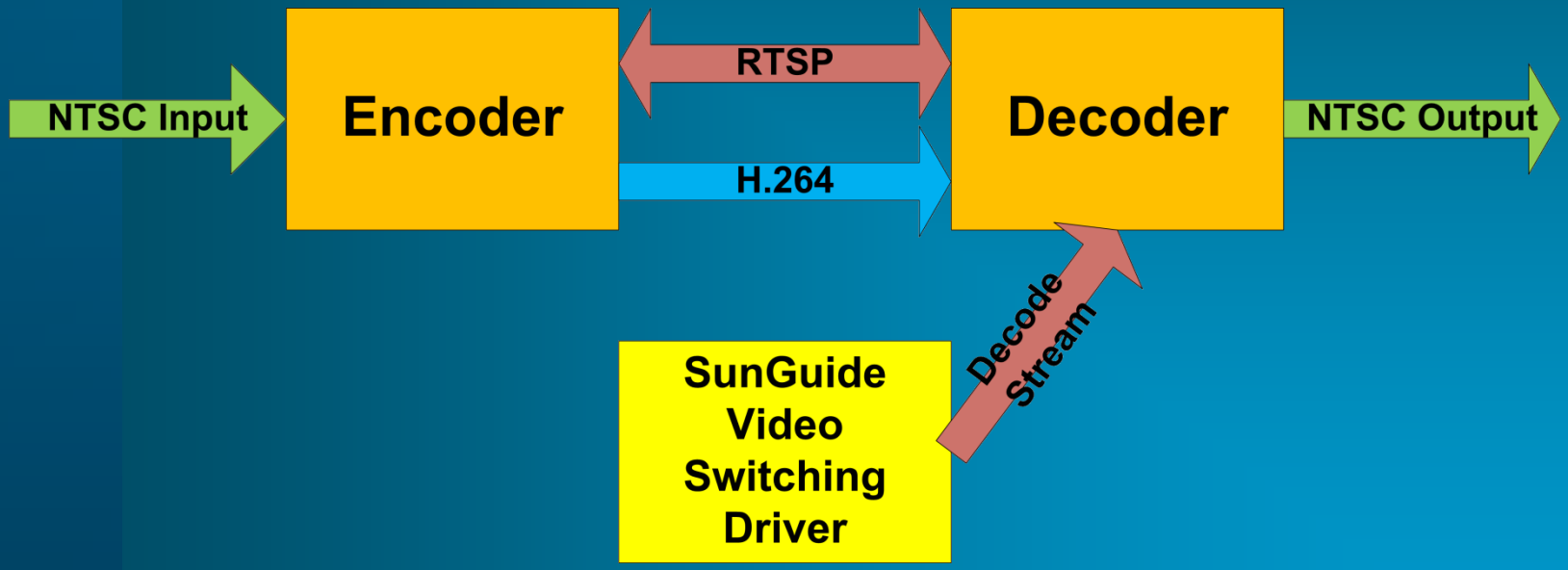
- PSIA
  - Decoder / encoder management
  - No PTZ

Direction from FDOT

- Switching management protocol
  - What, if any, protocol should be supported in addition to SNMP for encoder and decoder management
- Camera PTZ control
  - What, if any, protocol should be supported in addition to NTCIP 1205

Future SunGuide Video Switching

- Decoder management via ONVIF or PSIA
- Decoder & encoder negotiate encoded video stream



Change Management Board

Maintenance Inventory Management System (MIMS)

Arun Krishnamurthy

Dong Chen

James Barbosa

MIMS Overview

- Inventory tracking software
- Includes mobile application MIMA (Maintenance Inventory Mobile Application)
  - To support technicians on the field
  - Allows technicians access real-time online maintenance requests

Features of MIMS and MIMA

- Features include:
  - Configured to work with SunGuide
  - Real-time information
  - Inventory tracking including resource location and status
  - Inventory data entries and updates via handheld scanner
  - Online trouble ticket management
  - Reduced errors in transcribing data
  - Disaster preparation and response tools

Ongoing MIMS Activities

- District 4 is currently performing the following activities:
  - Update MIMS to be compatible with SunGuide Release 5.0
  - Add functionality to include not just ITS devices but all TMC hardware

- District 4 anticipates these two activities to be completed by end of March.

MIMS Ownership

- MIMS is not completely owned by the Department
- IBI owns libraries that are critical to the use of MIMS
- This library features include –
  - Low level software / device communications
  - Software framework
  - Utilities, logging
  - Generic / base asset management functionality
- SunGuide uses several vendor libraries. This library would be similar.
- IBI would allow the library to be used by SunGuide deployments.

Roll-out Plan

- If CMB chooses to integrate MIMS into SunGuide
  - SwRI will add IBI under their SunGuide contract
  - Typical tasks to be performed include:
    - Gather existing documents, create any missing content, update SunGuide docs (Requirements, Design documentation, updates to SUM, VDD)
    - Integrate into SunGuide
    - Conduct testing
    - Deploy in districts
- If CMB chooses to integrate MIMS in SunGuide
  - Available later this year

- **QUESTIONS**

- **VOTE**

Change Management Board

Software Video Decoder Viewer

Clay Packard

Software Video Decoder Viewer

- Operators need video viewers on desktop
  - No external hardware / software to purchase / track
  - No configuration necessary
- Fully integrated into map
  - Right-click on camera to launch (from context menu)
  - Button from CCTV status dialog to launch
- Basic window
  - Can be moved/resized
  - Includes button to launch the CCTV status (for PTZ)
- Options
  - System-wide configuration of max windows per desktop
  - Snapshot tooltips on hover over CCTV map icons

Estimated Costs (Vote)

- Base functionality
  - $23,000
- Limit Open Streams
  - $7,000
- Total Estimated Cost
  - $30,000
- *Vote*

Change Management Board

Database Storage Guidelines

Steve Novosad

Discussion Topics

- Why Perform This Analysis?
- Analysis Approach
- Initial Analysis – FDOT_OWN
- Initial Analysis – FDOT_ODS
- Recommendations
- Backup and Archiving
- Next Steps

Why Perform This Analysis

- Stores Critical Configuration Data
- Computes and Stores Operational Data
- Archives Historical Data
- Maintains Health and Performance

Analysis Approach

- Examine Database Schema
  - Districts Databases Loaded at TERL
  - Database Dumps Acquired from March to May 2010
  - District 5 Database used as Baseline
  - Ten Largest Tables Selected
- Review Known Issues
- Identify Inefficiencies
- Provide Recommendations

Initial Analysis – FDOT_OWN

- Five Largest Tables Averaged Across the Districts
  - EM_EVENT_CHRONO
  - EMAUDT_EVENT_RESPONDER
  - DA_DEVICE_STATUS
  - EMAUDT_EVENT
  - CCTV_LOCK_USAGE
- Operational Differences
- Continually Growing Tables
- Identify and Periodically Optimize Tables

Initial Analysis – FDOT_OWN

Deployment / Table Name	District 1	District 2	District 4	District 5	District 6	District 7	FTE
DA_DEVICE_STATUS	183,352 18,518,552	1,345,530 137,244,060	302,408 31,752,840	1,301,774 131,479,174	1,175,118 113,986,446	772,779 80,369,016	223,505 22,797,510
EM_EVENT_CHRONO	144,584 28,193,880	486,991 84,736,434	2,667,685 485,518,670	515,605 93,840,110	1,794,633 326,623,206	1,124,233 203,486,173	108,353 21,020,482
EMAUDT_EVENT_RESPONDER	235,214 17,405,836	651,588 48,217,512	5,999,455 455,958,580	836,743 61,082,239	3,447,138 261,982,488	1,809,192 139,307,784	189,785 15,752,155
IDS_INCIDENT_ALARM	3,479 313,110	1,241 134,028	128,567 15,556,607	449,648 51,259,872	3,451 393,414	13,383 856,512	444,845 50,267,485
EM_EVENT_RESPONDER	206,925 12,001,650	577,709 33,507,122	5,714,454 348,581,694	755,286 45,317,160	3,190,652 85,057,816	1,634,024 101,309,488	174,774 12,059,406
CCTV_LOCK_USAGE	100,210 6,814,280	341,168 18,081,904	2,819,604 140,980,200	612,203 39,793,195	2,901,675 145,083,750	478,483 27,752,014	325,958 21,187,270
EMAUDT_EVENT	66,140 9,987,140	175,881 25,150,983	1,061,294 163,439,276	221,931 32,623,857	739,168 116,049,376	400,616 60,493,016	47,695 7,297,335
EMAUDT_EVENT_LOCATION	25,171 7,073,051	83,900 21,981,800	576,639 167,801,949	119,588 31,092,880	258,673 73,463,132	194,168 50,677,848	20,556 5,981,796
IDS_TSS_ALARM_DATA	0 0	27 1,323	23 1,357	418,896 30,579,408	0 0	13,383 1,070,640	418,863 30,158,136
AVLRR_VEHICLE_HISTORY	16,299 847,548	12,453 560,385	355,701 19,919,256	184,489 16,972,988	30,097 1,414,559	1,728,832 124,475,904	961,376 75,948,704

Top Row in each Cell – Number of rows in table
Bottom Row in each Cell – Estimated table size in bytes

Initial Analysis – FDOT_ODS

- Data Persistence Criteria
  - Raw TSS Data – 14 days
  - Roll up Data – 3 years
- Accumulates Large Amounts of Data
- Constant Raw TSS Data Inserts/Deletes
- Continual Growth of Roll up Tables
  - Potential for Performance Issues
  - Potential Space issues
  - Deletion of Large Amounts of Data
  - Maintenance
- Footprint 1589 – Creation of Redundant Configuration Records

Initial Analysis – FDOT_ODS

Deployment / Table Name	District 1	District 2	District 5	District 6	District 7	FTE
ODS_TSS_LANE_POLL_DATA	17,940,645 1,847,886,435	33,744,246 3,205,703,370	51,752,139 5,175,213,900	71,993,380 6,695,384,340	19,926,722 2,012,598,922	34,671,294 3,155,087,754
ODS_TSS_ROLLUP_DATA	83,313,781 4,249,002,831	207,818,606 10,598,748,906	100,378,962 5,119,327,062	52,086,928 2,656,433,328	26,943,366 1,347,168,300	16,599,054 780,155,538
ODS_TRAVEL_TIME_INFO	6,640,227 398,413,620	44,508,891 2,581,515,678	646,904,627 31,698,326,723	30,267,630 2,209,536,990	48,837,584 3,272,118,128	3,014,310 207,987,390
ODS_TSS_LANES	960,519 79,723,077	1,198,737 62,334,324	1,203,055 91,432,180	4,370,421 288,447,786	63,999 4,479,930	1,037,541 70,552,788
ODS_TSS_ROADWAY_LINKS	496,471 34,256,499	374,985 21,749,130	655,746 46,557,966	1,422,761 88,211,182	27,932 2,039,036	437,518 31,938,814
ODS_DMS_MESSAGES	93,000 14,136,000	654,903 80,553,069	8,939,137 1,206,783,495	656,455 59,080,950	1,194,344 181,540,288	7,489 561,675
ODS_TRAVEL_TIME_LINK	529 60,306	1,536 90,624	26,720 2,217,760	13,435 1,222,585	4,465 339,340	1,091 79,643
ODS_TSS_DETECTOR_CONFIGS	217 14,756	839 115,782	1,383 182,556	1,464 184,464	2,181 287,892	2,176 295,936
ODS_DMS_IDS	53 2,385	66 1,980	239 10,516	109 3,161	83 2,988	182 6,734
ODS_DMS_LINKS	32 576	52 884	151 3,020	45 765	144 2,592	10 180

Top Row in each Cell – Number of rows in table
Bottom Row in each Cell – Estimated table size in bytes

Recommendations – FDOT_OWN

- Review schema design emphasizing reporting requirements
- Perform regular optimization
- Review District's operation and compare to fast growing tables
- Enable database logging
- Perform full database backups
- Review district specific tables

Backup and Archiving

- Archiving Considerations
  - Already being partially done
  - How large is the database now?
  - What are the largest tables?
  - Will the tables continue to grow?
  - At what rate will the tables grow?
  - What are the long-term data storage requirements?
- Backup Considerations
  - How much downtime is acceptable?
  - How much are you willing to invest in hardware, software, and backup media?
  - Do you require the backup to be automated?
  - Are you willing to accept degraded performance when backing up?
  - Is data primarily persistent with very little change?

Next Steps

- Provide document for District Review and Feedback
- Compare each District's Operations for similarities and differences
- Develop a propose approach
- Obtain overall concurrence of approach

Change Management Board

Action Item Review

Eric Gordin