

Dynamic Message Sign Central Software Information

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A report prepared for the
Montana Department of Transportation

August 2005

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1. INTRODUCTION

Currently the Montana Department of Transportation (MDT) has a total of 23 dynamic message signs (DMS). Seven of the signs are permanent by Vultron, eight are portable by Vermac, and eight are portable by US Traffic Corp. Currently, the signs are being controlled with their own software (i.e. three different pieces of software).

Challenges with the software include:

- All three cannot be loaded on the same computer.
- They are currently client based (i.e. the software is installed on each computer separately).
- Due to the client-based approach, the message logs are also saved on each individual computer, therefore to determine all of the messages that have been put on the signs, each computer that has the software installed on it needs to be queried.
- One of the pieces of software will only let the operator preview the first frame of the message and not multiple frames.
- None of the software is able to perform AMBER Alerts (i.e. put the same message on multiple signs in one move).

AMBER Alerts are an alert to the public via television and the radio about a child abduction. These alerts were started in 1996 in memory of Amber Hagerman, a child who was kidnapped and murdered. After her abduction, local law enforcement began coordinating with the broadcasters association to provide child abduction information to the public in hopes of finding children more quickly. Based on the fact that the first three hours are the most critical and many children are transported, Department's of Transportation (DOT) were approached to help disseminate information to the traveling public via their Intelligent Transportation Systems (ITS). ITS includes dynamic message signs (DMS), highway advisory radio (HAR), travel information phone numbers, and websites.

In August of 2002, dynamic message signs in California and Texas were credited with the safe return of children. Due to this, more DOTs have become involved in the AMBER Alert program. MDT signed an memorandum of understanding (MOU) with the Department of Justice (DOJ) on January 11, 2005 acknowledging the agencies will work together to disseminate child abduction information.

Due to the participation of MDT in AMBER Alerts, MDT is seeking more efficient and timely ways to provide the information to the traveling public. One way to accomplish this is to update the current DMS software to a central software that can better handle AMBER alerts.

This technical memorandum describes MDT's needs for new DMS software, examples/experience from other states, information from vendors, and lastly a table describing the possible options available to MDT for DMS software.

2. MDT NEEDS

Use of the current DMS software has provided valuable information which will be used to create requirements for the new software with an eventual request for proposal (RFP). The following explains some current needs.

- Central repository for messages (i.e. data management).
- Web – or server-based system not client-based.
- Compatible with Windows XP and upgradeable.
- Ability to poll sign and tell operator what the message is on all frames of the sign.
- Ability to build security into user levels in software.
- Ability to work with current network and dial-up capabilities.
- NTCIP compliant software.
- Ability to upgrade current DMS to NTCIP compliance to make software function.
- Ability to control Vultron permanent, US Traffic Corp. portable, and Vermac portable signs.
- Ability to set message priorities (e.g. if user attempts to put an AMBER message on the sign, ensure that it will not override a higher priority message) and to inform user of request acceptance or denial.
- Ability to send one message to multiple signs.
- Ensure the signs can be turned on and off remotely with the central software.
- Training.
- Software Maintenance.

3. EXAMPLES FROM OTHER STATES

In order to gain insight from other states, an email was sent to several DOTs to gain their experience on DMS software. Responses were received from South Dakota, South Carolina, Oregon, North Dakota, Kansas, Texas, and Iowa. The information from California was previously acquired.

The questions asked include:

How many and what vendor of DMS do you have? (see Table 1)

- Table 1 What type of software are you currently using to run these signs? (see Table 2)
- Are you using the central software for any other pieces of equipment (i.e. RWIS, HAR, CCTV, etc)? If so, what are your comments on that? (see Table 3)

Table 1: Number of DMS and Vendor

State	Number of Signs	Vendor
South Dakota	Currently – 8 Proposed - 22 in next year	Daktronics
South Carolina	131	Portables – Precision Solar Controls (96) Permanent – Ledstar and Fibers Display Solutions (35)
Oregon	61	Portables – Vermac (40) Permanent – Skyline (3), US Traffic Corp. (8), and Daktronics (10)
North Dakota	15+	Portables – Precision Solar, ADDCO, US Traffic, Daktronics, and Wannco
Kansas	21	Portable – Addco (5) Permanent – LedStar (16)

Table 2: Type of Software in Use

State	Software
South Dakota	Currently – Daktronics Future - upgrading to Intelligent Devices, Inc (IDI)
South Carolina	Currently – Vendor software (i.e. three different) Future – RFP for central software
Oregon	Skyline central software
North Dakota	IDI
Kansas	Vendor software for portables and NET central software for permanents
Texas	Southwest Research Institute developed software
Iowa	Currently – vendor software Future – testing Skyline’s central software and looking at IDI
California	Software created in-house

Table 3: Other Software Controlled by the DMS Central Software

State	Software	Using Software for Other Equip.	Notes
South Dakota	IDI	In future	Going to IDI because of it's capability to control other NTCIP devices and ability to create and manage traffic control scenarios
South Carolina	Working of RFP	In future	RFP, as a minimum, will include cameras, signs, incident detection (radar), weather systems, count stations, and web interface
Oregon	Skyline	US Traffic portable variable speed limit signs and skyline drum signs	
North Dakota	IDI	RWIS	Upgrading RWIS to NTCIP compliant (80% currently not compliant) to use with this software
Kansas	NET	CCTV, loops, RTMS, and HAR	Software is working well, but having glitches with uptime on some of the devices
Texas	Southwest Research Institute	No	
Iowa	Testing Software		
California	In-house	No	

4. DMS CENTRAL SOFTWARE PROVIDERS

To learn what options are available to MDT, several vendors were invited to MDT Headquarters to describe and demonstrate their software. The vendors included: ADDCO; Intelligent Devices, Inc; Skyline Products; TransCore; and Transdyn.

The following information relies on notes taken at the respective presentations.

4.1. ADDCO

4.1.1. Company

ADDCO has been in business for 52 years. Their product is called Virtual Transportation Operations Center (VTOC). Contact is John Mueller jcmueller@addcoinc.com (218) 586-2153.

Tested the software with Montana's signs. It worked with the US Traffic Corp signs, but not with Vermac signs. (Vultron signs were not tested).

4.1.2. Suite Information

- Software has the ability to control video, DMS, transit, traveler information systems, detection, variable speed limit signs, signal systems, and HAR.
- Will function on virtually any communications medium (i.e. low-bandwidth connection such as cellular, etc)
- TCP/IP protocol
- Written in java programming language
- Can use any ODBC compliant database system including oracle, Microsoft SQL, and Informix
- Three types of data input – live devices pane (graphical representation of devices), zones pane (group devices by location, agency responsibility, user preference, etc), or scenario pane
- Can be used either remotely or on site (i.e. from home)
- Operator restrictions can be created for security reasons (i.e. creating messages)
- Will provide maintenance – can provide software and hardware upgrades to system (latest software as becomes available) and full time telephone customer support
- System is expandable
- Can run over the internet

4.2. Intelligent Devices, Inc

4.2.1. Company

Their product is called Intelligent Control. Contact is Michael Howarth at mhowarth@intelligentdevicesinc.com (949) 644-2448.

This company also has the ability to upgrade current signs to NTCIP compliant to work with their software.

4.2.2. Suite Information

- Can set three security levels for software
- NTCIP compliant
- Windows based software

4.2.3. DMS Section of Suite

- Capabilities include sign control, scheduling, scenarios, AMBER Alerts, and sequencing
- Capability to email when error occurs
- Can communicate with DMS, RWIS, cameras, radar, and traffic sensors
- Ability to list protocols for particular scenarios (ex. Road closure, who to notify and update, etc)

4.2.4. Map

- Capabilities include display maps including map management and icon management, and GPS map interface
- Has a map with it showing all devices
- Data/messages can be updated by clicking on the device on the map

4.3. Skyline Products

4.3.1. Company

Skyline has been in business for 35 years. Their product is called DMS NTCIP Central Control Software. Contact is Rick DiFiore at rickdifiore@skylineproducts.com (719) 884-3794. Over 700 of their DMS have been deployed nationwide.

4.3.2. Software

- This software is NOT a suite (i.e. DMS is all that can be controlled)
- Software is client/server based
- Ability to do sign views, map views, and list views

4.3.3. DMS Information for Software

- Software can measure message on sign by pixels (this is not an NTCIP function therefore will only work with Skyline signs)
- Can control any NTCIP compliant vendor's
- Software can email error messages as needed

- Has security access to signs
- Has spell checker
- Has word list that can be input with words not allowed to go on sign
- Message libraries can be created with operators restricted to these (i.e. restricted to not create their own messages)
- Ability to create priorities so messages cannot be overridden
- Ability to measure status of sign (i.e. what is on the sign, power, temperature, controller, airflow, brightness, control mode, source, priority, pixel test, airflow test, time left, and communication)
- Ability to group signs (i.e. for AMBER)
- Ability to program signs (on/off)
- Ability to preview sign
- Enhanced preview of sign (i.e. picture of actual area sign is in with message on the sign) won't work for portable signs as they move around too much
- Ability to archive messages (i.e. message logs) on central server

4.3.4. Map

- Map view can be zoomed and positioned

4.4. TransCore

4.4.1. Company

Transcore has been in business for 30 years. Previously known as JHK. References include Wisconsin DOT and Utah DOT. Their product is called TransSuite. Contact is Frank Stock at frank.stock@transcore.com (406) 431 2101.

4.4.2. Suite Information

- Suite contains controls for traffic signals, video, incident management, traffic management, and traveler information (DMS and HAR)
- Suite has ATMS explorer views and ATMS map views
- Client-server and web based
- Currently uses Oracle database (using 9i now and in future 10g)
- NTCIP compliant center-to-center and center-to-field communications
- TCP/IP based
- Works with standard remote access (e.g. VPN, dial-up, etc)

- Supports hyperlinks to GIS databases, excel sheets, websites, pdfs of manuals, next sign, etc
- There may be communication issues with a central server (e.g. long distance charges), but Kentucky has set it up so central server dials terminal servers
- Data can be exchanged between Transuite and CAD systems
- Information about incidents, traffic maintenance, sign lists, radios, cameras, and congestion can be sent to the website
- Transuite is priced by module and there is a license fee
- Source code can be provided if needed
- Support contracts are possible either with a fixed cost or a cost per maintenance time

4.4.3. DMS Section of Suite

- TransCore has previously worked with Vultron and US Traffic Corp signs, but not Vermac signs.
- Easy for user to add new DMS when purchased
- Ability to use What You See Is What You Get (WYSIWIG) to show the sign as it actually is (i.e. full matrix)
- DMS log includes message diagnostics, power failures, message creation, and schedules
- DMS logs are stored on server
- Ability to store messages
- Ability to create an approved word list (e.g. person in charge of system can put all words that are acceptable for use on DMS in this list)
- Automated scheduling available
- Can create messaging plans (e.g. plan 1 = sign 1, 4, and 5 with message 3)
- There is no spell check, however, the words will be checked against the approved word list
- Software can verify sign character length notifying user if message is too long for sign
- Can relate message on sign, but not a true polling (i.e. not pixel by pixel)
- Can create message priorities (i.e. AMBER could not override a lane closure)

4.4.4. Map

- Their maps are ESRI compliant and geocoded and can be used with MDT database or with a vendor such as Teleatlas
- Each device is shown as a layer on the map to clutter/declutter map

- AVL/GPS on DMS would be usable with the map (they have done some work with fleet vehicle management and AVL)
- Ability to save the maps views on each desktop (i.e. the districts can save view so it will only be their district)
- The maps will color code the signs to show if they are online (green), failed (red), and offline (blue)
- If you double click on the DMS on the map, the message will display
- RWIS and cameras can be included as layers on the map

4.5. Transdyn

4.5.1. Company

Transdyn has been in business for 30 years. Their product is called DYNAC.

Contact is Chris Sorenson at csorensen@transdyn.com (925) 225-1600 or Clive Gillon at cgillon@transdynatlanta.com (678) 473-6400.

4.5.2. Suite Information

- Software controls/interfaces with traffic controllers, vehicle detection, cameras, DMS, HAR, Highway Advisory Telephone, ramp metering, emergency call boxes, AVL, road weather information, regional advisory information, dispatch communications, web, toll tag readers
- 200+ customer sites
- Open architecture (TCP/IP, SQL/ODBC, NTCIP, Java)
- Integrateable with commercial software
- Will provide source code to customers
- True redundancy with automatic data synchronization and fail-over
- Scalable and modular (i.e. can purchase only certain pieces of the product, but can turn them on and off as needed)
- Data dictionary, NTCIP, and Architecture compliant
- Customer screens and data displays are customized to the customer's needs
- System can be married to CAD software

4.5.3. DMS Section of Suite

- Have interfaced with Vultron and US Traffic Corp before, but not Vermac
- For AMBER must use the incident manager part of the software
- Can set priority messages

- Roles and permissions can be set for creating messages
- Signs can be pre-programmed
- Portables can be located via GPS and zooming capabilities on the map are available
- AVL is a possibility with this software
- System can identify when message is too long for the sign sending notification to the operator
- There is no spell check
- Can set a queue for messages based on message priority
- Can schedule messages, but this is in the incident response manager part of the suite (IRM)
- Have conflict management on software (i.e. if two people pick the same device, they are notified that the device is being used by another person) – there may be a problem with this if someone has left their work station and is logged in
- Willing to work with other vendors to integrate pieces of equipment
- Browser based/web based so it can be used from home
- Has the ability to set AMBER Alerts
- Ability to set priorities

4.5.4. Map

- Graphical display features called DynDisplay and DynDraw allow display of dynamic symbols
- It is possible to put these symbols on an existing map file such as CAD or GIS
- Operators would be able to click on the DMS and input data that way
- Portable symbols could be moved around manually
- Have plans to create a GIS map so portables could be tracked by GPS on the map – has not yet been done

5. OPTIONS AVAILABLE FOR CENTRAL SOFTWARE

Table 4 lists the options available for central software. These options were taken from the information provided by the vendors that presented to MDT. The options have been broken into three separate categories including technical options, DMS options, and map options.

The decision effecting the specifications the most is whether MDT wants software that can only control DMS, or software that is expandable to control multiple devices. This would be useful if a statewide operations center is deployed.

The column on the right of Table 4 is for DMS central software committee. Please place a check mark next to the items that you feel are the most important and should be included in the RFP. Remember only the most important items should be included otherwise no vendor will be able to bid as no vendor can fulfill all of these functions.

Table 4: Options Available to MDT

Technical Options	Option Wanted by MDT?
Software ability to control DMS	3
Software ability to control cameras	
Software ability to control detection	
Software ability to control variable speed limit signs	
Software ability to control signal systems	
Software ability to control HAR	1
Software ability to control RWIS	
Software ability to control emergency call boxes	
Software ability to control AVL	
Software ability to control traveler information	
Software ability to control highway advisory telephone	
Software ability to control ramp metering	
Software ability to control regional advisory information	
Software ability to control dispatch communications	
Software ability to control web	
Software ability to control toll tag readers	
Software ability to control traffic management	
Software ability to control incident management	
Function on virtually any communications medium (i.e. low-bandwidth connection such as cellular, etc)	2
TCP/IP protocol	
Written in java programming language	
NTCIP compliant	3
Windows based software	3
Can use any ODBC compliant database system including oracle, Microsoft SQL, and Informix	1
Can be used either remotely or on site (i.e. from home)	2

Table 4: Options Available to MDT (cont.)

Technical Options	Option Wanted by MDT?
Operator restrictions can be created for security reasons (i.e. creating messages)	1
Will provide maintenance – can provide software and hardware upgrades to system (latest software as becomes available) and full time telephone customer support	1
Software is client/server based	1
Sign View	2
Map View	1
Zone Pane (I.e. group devices by location, etc)	1
List View	
Scenario Pane	
Client-server and web based	2
Center-to-center and center-to-field communications	
Supports hyperlinks to GIS databases, excel sheets, websites, pdfs of manuals, next sign, etc	
Data can be exchanged between software and CAD systems	
Source code can be provided if needed	
Support/maintenance contracts	2
True redundancy with automatic data synchronization and fail-over	
Scalable and modular (i.e. can purchase only certain pieces of the product, but can turn them on and off as needed)	
Data dictionary and Architecture compliant	
Customer screens and data displays are customized to the customer's needs	
Provide future upgrades to software (especially NTCIP changes)	
Ability to send software data to a web site	
Training available	1
Customer support	1
DMS Options	
Capabilities include sign control	1
Capabilities include scheduling	1
Capability to store a message library	2
Capabilities include scenarios/messaging plans/group signs (e.g. plan 1 = sign 1, 4, and 5 with message 3)	1
Capabilities include AMBER Alerts	1
Capabilities include sequencing	1
Capability to create priorities so messages cannot be overridden (i.e. AMBER could not override a lane closure)	1
Capability to set a queue for messages based on message priority	
Capability to create message libraries so operators can be restricted to these (i.e. restricted to not create their own messages)	2

Table 4: Options Available to MDT (cont.)

DMS Options	Option Wanted by MDT?
All of the above capabilities to be in the DMS portion of the software (i.e. in some cases will need to go into incident management portion for scheduling)	
Spell check	2
Word list that can be input with words not allowed to go on sign (e.g. person in charge of system can put all words that are acceptable for use on DMS in this list)	1
Software can measure message on sign by pixels (this is not an NTCIP function therefore will only work with Skyline signs)	1
Can relate message on sign, but not a true polling (i.e. not pixel by pixel)	1
Ability to preview sign	1
Enhanced preview of sign (i.e. picture of actual area sign is in with message on the sign) – won't work for portable as they move around too much	
Ability to use WYSIWIG to show the sign as it actually is (i.e. full matrix)	
Can measure status of sign (i.e. what is on the sign, power, temperature, controller, airflow, brightness, control mode, source, priority, pixel test, airflow test, time left, and communication)	1
Software can email error messages as needed	
Software can verify sign character length and will notify user if message is too long for sign	
Easy for user to add new DMS to software when purchased	2
Capability to include DMS log (includes message diagnostics, power failures, message creation, and schedules) and store on central server	1
Portables can be located via GPS and zooming capabilities on the map are available	
AVL is a possibility with this software	
Conflict management on software (i.e. if two people pick the same device, they are notified that the device is being used by another person) – there may be a problem with this if someone has left their work station and is logged in	
Willing to work with other vendors (i.e. sign vendors) to integrate pieces of equipment	1
The ability to set AMBER Alerts	1
Map Options	
Capabilities include display maps including map management and icon management, and gps map interface	1
Map that shows all devices	2
Data/messages can be updated and viewed by clicking on the device on the map	1
Map view which can be zoomed and positioned	

Table 4: Options Available to MDT (cont.)

Map Options	Option Wanted by MDT?
Their maps are ESRI compliant and geocoded and can be used with MDT database or with a vendor such as Teleatlas	
Each device is shown as a layer on the map to clutter/declutter map	
AVL/GPS on DMS would be usable with the map	1
Can save the maps views on each desktop (i.e. the districts can save view so it will only be their district)	1
The maps will color code the signs to show if they are online (green), failed (red), and offline (blue)	
RWIS and cameras can be included as layers on the map	
Put ITS symbols on an existing map file such as CAD or GIS	
Portable DMS symbols could be moved around manually on the map	
Other Options	Option Wanted by MDT?
Ability to manage historical data	1