SUNGUIDE® DISSEMINATOR

Florida Department of Transportation's Traffic Engineering and Operations Newsletter

Welcome to the Northwest Florida SunGuide® Center

By Lee Smith, FDOT District Three

The Florida Department of Transportation (FDOT) District Three celebrated the dedication ceremony for its new Northwest Florida SunGuide® Center on December 10, 2015. This state-of-the art facility is Florida's newest regional transportation management center (RTMC) for operations and management of Florida's District Three roadways.

Outside of the Northwest Florida SunGuide Center.

Northwest Florida SunGuide Center.

This $24.3 million RTMC is powered by a fiber optic network stretching 158 miles along I-10, from SR 87 in Santa Rosa County to US 90 in Gadsden County. The new RTMC links on the western side to the existing intelligent transportation systems (ITS) covering the Pensacola metro area, and on the eastern side to the Tallahassee metro ITS area.

Also covered are 56 miles of US 231, from the Alabama state line into Bay County, and nine miles of US 90, from the US 231 intersection to the Northwest Florida SunGuide Center.

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ITS: The Application of Technology to our Roadways

ITS uses a platform of advanced technologies to deliver real-time visual and statistical data to the Northwest Florida SunGuide Center. Early next year, when the center is fully operational, it will be staffed around-the-clock, seven-days a week and in continuous communications with law enforcement, fire protection, emergency medical services, and other first responders.

Message on dynamic message sign alerting travelers of blocked lanes.

ITS components managed by the Northwest Florida SunGuide Center include:

- 184 closed-circuit television cameras that provide visual coverage of 158 miles of I-10 and 56 miles of US 231.
- 19 overhead dynamic message signs to communicate important traveler information.
- Eight highway advisory radios for broadcasting emergency information via standard AM radio.
- 181 vehicle detectors and travel time sensors to monitor traffic flow.
- Three road weather information system stations to provide advance warning of inclement weather.

Benefits for Travelers

The new RTMC will improve incident response times along I-10 and US 231. Personnel monitoring the system can now accurately identify incident locations, assess the severity of incidents, and ensure the appropriate emergency responders and equipment are dispatched.

In addition, RTMC personnel can alert drivers to traffic incidents, adverse weather conditions, and other scenarios before they are encountered. These advance warnings can prepare drivers to slow down approaching an incident scene, or in some cases, to seek an alternate route.

New Road Ranger service patrols complement the RTMC. The addition of service patrols on this 158-mile segment of I-10 provides Road Ranger coverage 12-hours a day, five-days a week on I-10 from the Alabama state line to Exit 209 (US 90) in Leon County.

Beginning in spring 2016, data and images from the new RTMC will be available online at www.D3SunGuide.com. Drivers can also use the web site to see information from the Pensacola, Tallahassee, and Panama City systems.

For information, please contact Mr. Smith at (850) 330-1504 or email to Lee.Smith@dot.state.fl.us.

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District Four ITS Unit Develops New Update for MIMS

By Natalie Cortes, FDOT District Four

The Florida Department of Transportation (FDOT) Intelligent Transportation Systems (ITS) Unit has a statewide reputation for trailblazing. Recently, District Four's ITS Unit created a new application in conjunction with its current Maintenance and Inventory Management Systems (MIMS) software. What sets this application apart from alternative options is its integrated design to SunGuide® software, the statewide advanced traffic management software used at District Four's Regional Transportation Management Center (RTMC) to operate ITS devices.

The original MIMS software was created in 2010 as a time-saving method for inventory audits. As all ITS equipment is barcoded and secured to prevent loss, District Four realized it took employees five weeks to track ITS devices and created a solution to quicken the process. Now, the advanced software is available through a smartphone application that provides users with access to key MIMS functions to further streamline maintenance and inventory management activities.

The application eliminates the need for field-hardened laptops and barcode scanners used during maintenance or inventory audits, bringing the District a possible savings of $12,000 for 2016. New features also allow users to scan inventory items' barcodes and quick response codes using their smartphone cameras. In the case where users need to verify or update an item's location, the application supports their smartphone's global positioning system receiver coordinates and then updates the location of the scanned item. The application incorporates a geographic information system Google Map displaying geo-located inventory items for selection as well as list-based searches.

District Four maintenance technician uses MIMS software on his field laptop. The MIMS software is now available as a smartphone app.

Created as a hybrid mobile application, the MIMS app is capable of running on Apple's iOS, Android, and other smartphone technologies. District Four anticipates the application to evolve into a self-learning software based on historical device failures that monitors ITS while identifying and predicting potential problems. District Four released the application in December 2015.

For more information please contact Mr. Dong Chen at (954) 847-2785 or email to Dong.Chen@dot.state.fl.us.

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FHWA Scan Tour

By Raj Ponnaluri, FDOT Traffic Engineering and Operations

Florida Department of Transportation's (FDOT) Transportation System Management and Operations (TSM&O) Program has been actively participating in and contributing to the national dialogue on the best practices on TSM&O in general and arterial management in particular. At the sponsorship and invitation of the Federal Highway Administration (FHWA), the FDOT's Central Office TSM&O Program was represented by Raj Ponnaluri on an FHWA Scan Tour to departments of transportation (DOT) in Indiana (InDOT), Utah (UDOT), and Georgia (GDOT). FDOT accompanied Pennsylvania DOT and the Pennsylvania's FHWA Division Office. This Scan Tour was made possible due to the leadership of the FHWA Regional Office in Atlanta. FDOT is fortunate to work closely with the FHWA Division Office in Tallahassee in the many joint activities that are developed at various levels. One of the main objectives of this Scan Tour was to understand the roles of the state DOT programs in terms of management, design, operations, and maintenance activities and the extent of the systems.

In general, the three DOTs, i.e., InDOT, UDOT, and GDOT have been approaching the management of arterials and other efforts in ways that best fit their needs. InDOT actively collaborates with Purdue University in continually streamlining the signal performance metrics (SPM) dashboard, and also has efforts underway to develop tools for use within a transportation management center (TMC). Examples include the use of available data sources, including those from third parties, to make decisions in real time.

UDOT has invested resources and effort to make the Purdue system a reality by continually developing new tools within the SPM dashboard. Their goal is to take the available techniques and methods to provide the best possible capabilities, including a focus on arterial management within a TMC.

GDOT, on the other hand, places importance on field-level operations with its stated mission to "increase the travel throughput by minimizing congestion and reduce delays along regional commuter corridors through improved signal operations." The common link among all of these efforts, as in Florida, is the mission-centric leadership to develop programs that can produce field-level improvements for the benefit of all road users.

A review of the programs in the three states, and reflecting on the new TSM&O initiatives in Florida, shows that FDOT's mission to develop a strong Statewide Arterial Management Program (STAMP) is timely and visionary, in that the state is considering deployments that are intended to not only yield positive traffic operational results, but also aid in studying areas for improvement. FDOT is not only learning from other states, but is also contributing to the national discussion on various aspects of TSM&O including effective management of its arterial system.

For information, please contact Dr. Ponnaluri at (850) 410-5616 or e-mail to Raj.Ponnaluri@dot.state.fl.us.

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District Five: Doing it Better

By John D. Whitman, Technology Assurance Labs

Opportunity

In mid-2014, the Florida Department of Transportation (FDOT) Central Office reallocated their Internet Protocol (IP) addressing space to more fairly divide the number of addresses amongst all FDOT Districts. The reason for the scheme was to allow the Transportation Systems Management and Operations (TSM&O) network to communicate between all of the Districts through the intelligent transportation systems wide area network (ITS WAN) that spans the entire state. The new scheme would improve communications, add space to restricted Districts, and prevent problems associated with duplicate IP addresses that might currently be in use in more than one District. This request provided an opportunity for District Five to evaluate how they operate and to expand their own ITS network.

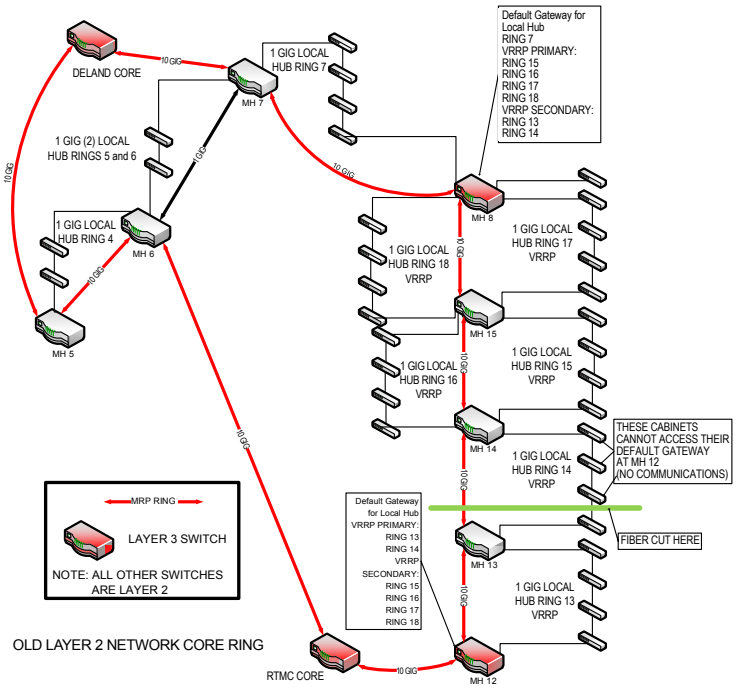
Challenge

District Five believed that a paradigm shift was needed from the old "***keep it running***" attitude to a "***do it better***" attitude. One of the problems experienced by District Five was that fiber was installed on only one side of the roadway for most of I-95 with no physically redundant routes available. When a fiber cut occurred, some of the Layer 2 communications could not reach the default gateway, or the rest of the network.

A logical ring topology resolves the issue of redundancy to the core, but that has to be accomplished by configuring each virtual local area network (VLAN) with two paths to the core. For a full Layer 2 implementation, the result would be even bigger core switches and VLANs that spanned everywhere in the network. This was a solution that does not scale well. Additionally, if one VLAN is misconfigured, it could cause a Bridge Protocol Data Units storm; in other words a small mistake would take down an entire system versus a localized area, and adversely impact the entire network.

District Five wanted an industry standard protocol that would do the following:

1. Stabilize the network
2. Make the network more scalable
3. Be compatible with equipment from multiple vendors
4. Be an industry standard and not proprietary (to increase competition between vendors)
5. Provide redundancy (second route for communications)
6. Minimize the loss of communications to local hubs in the event of a device failure or a fiber cut (no more miles of unmonitored highway)



District Five's TSM&O personnel understood the hardware requirements when it came to environment, but they needed to better understand the protocols that determine the type of networking equipment that would be needed.

Solution - Layer 3 vs Layer 2

The solution was simple, available, and mature, and would not add significant cost when replacing the aging network equipment. District Five needed to rebuild the network using Layer 3 instead of relying mostly on Layer 2. Previously, this had been cost prohibitive; however, new products had drastically reduced the cost to add this functionality and made the implementation cost-effective. In fact, Florida's Turnpike Enterprise's (FTE) Tolls Division had already implemented the devices in the field with good success prior to District Five moving to the new hardware.

Layer 3 benefits provide a protocol-based solution for redundancy (virtual routing redundancy protocol [VRRP]) that minimizes the problems experienced during fiber cuts.

Routing, not VLAN tagging, would take place at the cabinet level in the field rather than solely at the core. This allows segmentation and minimizes the impact of Layer 2 communications to a local area. Configurations are local, allowing for scalability. This provides flexibility in how it can be implemented, and it removes the need for proprietary Layer 2 protocols like metro ring protocol (MRP), Ethernet automatic protection switching, multiple spanning tree protocol, virtual switching, and other protocols that are in use in the ITS world. Additionally, Layer 3 routing has diagnostic protocols like ping and trace route that reduce troubleshooting time.

The downside to moving to Layer 3 is that new hardware is needed. The timing was good for District Five since they needed to replace the old network switches and move all of their equipment to a new IP range. Planning the network design requires a solid understanding of how subnetting is applied to properly design the network and minimize wasting IP addresses. With Layer 3 being used down to the local cabinets, one has to do the following:

1. Know how many cabinets are between two master hubs
2. Plan how many IP addresses will be available per cabinet
3. Provide a default gateway in each local cabinet
4. Plan IP addresses for point-to-point connections between each local hub
5. Plan point-to-point connections between all master hubs

There are some limits on future flexibility based on the addressing scheme. When planning the Layer 3 implementation, extra IP addresses are needed for expansion. If there are not enough IP addresses to accommodate the expansion, or unplanned for cabinets are added, then that area of the network will have to be reconfigured—a process that is far more complicated than a Layer 2 reconfiguration. Also, addressing is more complex with variable length subnet masking (VLSM) versus a consistent 24-bit subnet mask, but this is not uncommon with campus level implementations when addressing space must be conserved.

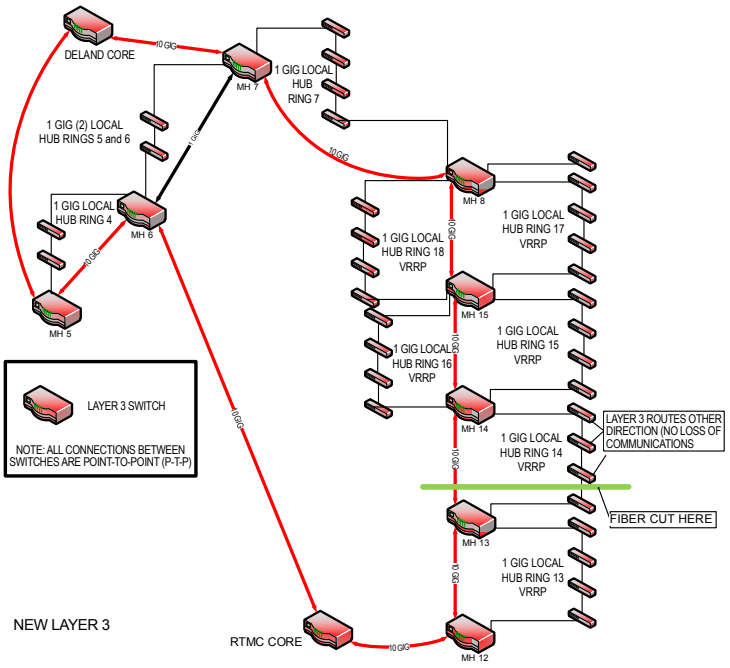
Implementation Steps

The new network would require the following steps to be taken in order to properly plan for it:

a. Determine what protocols are required to support communications from the local hubs to the regional transportation management center (RTMC)
b. Create an IP scheme for the entire network with
   - Available IP addresses
   - An understanding of VLSM
   - An understanding of how to structure a Layer 3 network
   - Knowledge of Layer 2 and Layer 3 protocol dependencies
c. Have accurate documentation of the location of each local hub
d. Have accurate documentation of the contents of each local hub (required to determine the maximum number of IP addresses required for each cabinet)
e. Have accurate documentation of the fiber connections between each hub (this step is very important as it impacts how the IP scheme is applied)

With that information, District Five knew that the network would require the following protocols:

a. Rapid Spanning Tree for Layer 2
b. Open Shortest Path First for Layer 3



c. Internet Group Management Protocol for Layer 2
d. Protocol-Independent Multicast (PIM) for Layer 3

Test Section

District Five used a small area of the network between two master hubs and installed new switches in a series parallel to the existing network. They transitioned the equipment from the old Layer 2 network to the new Layer 3 network, which required changing IP addresses on the equipment. The work took time and resources; but if the test network were successful, District Five would only need to continue the process throughout the rest of the network.

Once the first segment was installed, District Five noticed there were fewer service calls to that area. A month later, they added another segment and master hub to the Layer 3 network. Once again the Layer 3 network was expanded and completed the west end of I-4 with a total of three master hubs and 40 local hubs. The Layer 3 area was the most stable section of the network and it was decided that a Layer 3 network was a viable solution and to continue the transition for the entire network.

Today's Implementation

Currently, the implementation process has all of I-4 running Layer 3 (excluding any construction project and the Ultimate I-4 project); I-95 has all of its master hubs and 20 percent of the local hubs running Layer 3; I-75 is being rebuilt and will be all Layer 3 by the end of 2016.

District Five has a few steps left to complete their network:
a. Isolating District Five network from local agency networks

- Improves network stability for District Five and other agencies. (This eliminates one agency making a change to their network that might have an impact on any of the other agencies that are directly connected.)
- Allows agencies to have their own PIM domain
- This improves management of video streams
- Improves troubleshooting of video as each agency manages their own separate PIM domain (instead of one large conjoined PIM domain)
- Decreases central processing unit utilization on routers and switches by reducing the size of each agency's network

b. Complete the Continuity of Operations Plan
- Provide a secondary site for operations should the RTMC go down

c. Implement unicast to multicast recasting server for statewide compliance (Thanks to FTE)
- This reduces the impact of PIM on the network
- It reduces time required to troubleshoot video problems
- Improves network security
- The unicast to multicast recasting server eliminates the need to provide internal IP addresses to external entities
- Provides a central point to manage video

For information, please contact Mr. Jeremy Dilmore at (386) 943-5360 or e-mail to Jeremy.Dilmore@dot.state.fl.us.

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Connected Vehicles for Smart Cities

By Suzanne Murtha, Atkins

On December 7, 2015, the United States Department of Transportation (USDOT) announced a grant for a single city to be awarded $50 million to create a "smart" environment for transportation and other infrastructure. The USDOT will pick five round-one winners from all of the grant applicants and each of those five round-one winners will receive a $100,000 grant to further develop their topics. The $50 million winner will be chosen from the five finalists.

On December 15th, the USDOT held an all day meeting at its Washington, DC headquarters. Panelists were from various modal administrations of USDOT, including the Office of the Secretary, National Highway and Transportation Safety Administration, Federal Transit Administration, and Federal Highway Administration as well as several White House advisors. All of the panelists were sharing guidance on what comprises a "Smart City."

Some of the key themes discussed were:

- Partnership – Panelists discussed at length the importance of building on relationships across all types of industries. The transportation industry is currently too insular and we need to look to "invest other people's money" into improving transportation. Non-traditional partnerships were strongly encouraged.
- Jobs – With increasing population growth, a Smart City will have transportation jobs for younger transportation professionals. According to panelists, the average age of the transportation professional is 43 years, thus not including enough young professionals. Also, many cities have been hosting "data bootcamps," which include training programmers for more high-tech roles. A Smart City may include a program such as this.
- Public Transit – An existing public transit system is a prerequisite for the bid response. The winning city will have solutions to improve transit and integrate it into a smart environment. Transit should be integrated with other types of transportation and would be a key part of the Smart City.
- Beyond transportation – Other types of infrastructure, such as electric charging stations, water, waste management, and utility integration, would also be potential aspects of a winning bid.

After the five finalists are announced, USDOT is planning a limited roadshow in Tucson, Arizona, and potentially Portland, Oregon, to discuss the winners and the concept. USDOT hopes to announce the finalist at South by Southwest® in Austin.

For information, please contact Mr. Fred Heery at (850) 410-5606 or email to Fred.Heery@dot.state.fl.us.

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Put It Down! and Move Over: Saving Lives this Holiday Season

By Michael Washburn, Florida's Turnpike Enterprise

"Put the cell phone down while driving" and "Move over for emergency responders on the shoulder" were the main safety awareness messages relayed to hundreds of Florida's Turnpike motorists on December 17th at the West Palm Beach Service Plaza during a public safety outreach event coordinated by Florida's Turnpike Enterprise Highway Operations and the Florida Highway Patrol (FHP).

Public safety outreach event.

Targeting pre-holiday December travelers, Turnpike representatives and FHP Troopers were also joined by Turnpike towing partners and the Turnpike's State Farm Safety Patrol Road Rangers in handing out "Move Over, It's the Law" bumper stickers and license plates, "Put It Down" distracted driving magnets and informational cards, and Florida 511 cups and travel mugs. FHP cruisers, a Road Ranger vehicle, and recovery wreckers were on display outside the service plaza to draw motorists' attention.

Jim Jennings, Emerald Towing owner and Florida's Turnpike Traffic Incident Management Team member, greeted travelers with safety information goodie bags.

"While we will never know, if only one person moves over a lane the next time they see an incident on the shoulder, it could save the life of a tow operator, Road Ranger, or Trooper," Jennings said.

Nationally, there has been a 14 percent increase in the number of traffic fatalities (18,630) compared to the first half of 2014. If this rate continues for the full year of 2015, it will mean the highest fatality rate since 2007. More than 30 states, including Florida, are seeing upwards of 20 percent increases in fatalities. The National Safety Council has said that distracted driving and cellphone use are contributing factors in 25 percent of crashes.

Following national and statewide trends, distracted driving is cited as a contributing factor in more than 50 percent of 41 fatal crashes on Florida's Turnpike in 2015. Distracted driving is a risk to everyone on Florida roadways, including motorists and their passengers, law enforcement, emergency responders, pedestrians, and bicyclists.

The December 17th outreach event was designed to make drivers aware before they get on the road for their holiday travels, and feedback was very positive. A number of long-distance commercial truck drivers told FHP and Turnpike operations personnel that the problem of distracted driving is getting worse based on their observations on the road. A local company fleet manager took a number of "Move Over" bumper stickers and license plates to place on all his vehicles. Local television media also attended the event, interviewing FHP Troopers and towing operators before taking a ride-along trip with an FHP Trooper.

Florida's Turnpike Highway Operations plans to continue implementing an aggressive public safety education campaign that includes themed DMS messaging, student/school outreach, safety events and social media participation.

For information, please contact Mr. Eric Gordin at (407) 264-3316 or e-mail to Eric.Gordin@dot.state.fl.us.

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FDOT District Six Begins Regional ITS Architecture Update

By Javier Rodriguez, FDOT District Six

The Florida Department of Transportation (FDOT) District Six has begun working with Central Office on the District Four and Six Regional Intelligent Transportation Systems (ITS) Architecture Update to comply with the Federal Highway Administration's Rule 940.

The architecture serves as a roadmap for ITS projects in the southeast Florida region. The document is updated every ten years to define the vision and reflect the region's current ITS architecture. The update serves as the framework on how informational exchanges should be handled with an emphasis on information that crosses institutional boundaries.

District Six served as the agency's liaison in Miami-Dade and Monroe Counties. District Six worked in conjunction with District Four to identify the regional stakeholders that would be playing an important role in ITS deployments moving forward. Central Office met with the individual stakeholder agencies to learn about their initiatives and get their input to update the architecture. After these introductory meetings were held, Central Office hosted a workshop with all of the stakeholders to provide an overview of the regional ITS architecture and address any questions in a regional approach.

Central Office collected input from stakeholder interviews and workshops, and reviewed existing documentation to create a draft architecture, which was posted on a web site. All stakeholders were notified of the web site's location for their review and input. The update will be finalized once the review period is over and it will serve as a resource and reference material for both the agency and its partner agencies until the next update is due in 2025.

The statewide and regional ITS architectures represent a shared vision of how each agency or stakeholder's systems will work together in the future—sharing information and resources to provide a safer and more efficient transportation system for travelers in the State of Florida.

For information, please contact Mr. Rodriguez at (305) 470-5757 or email to Javier.Rodriguez2@dot.state.fl.us.

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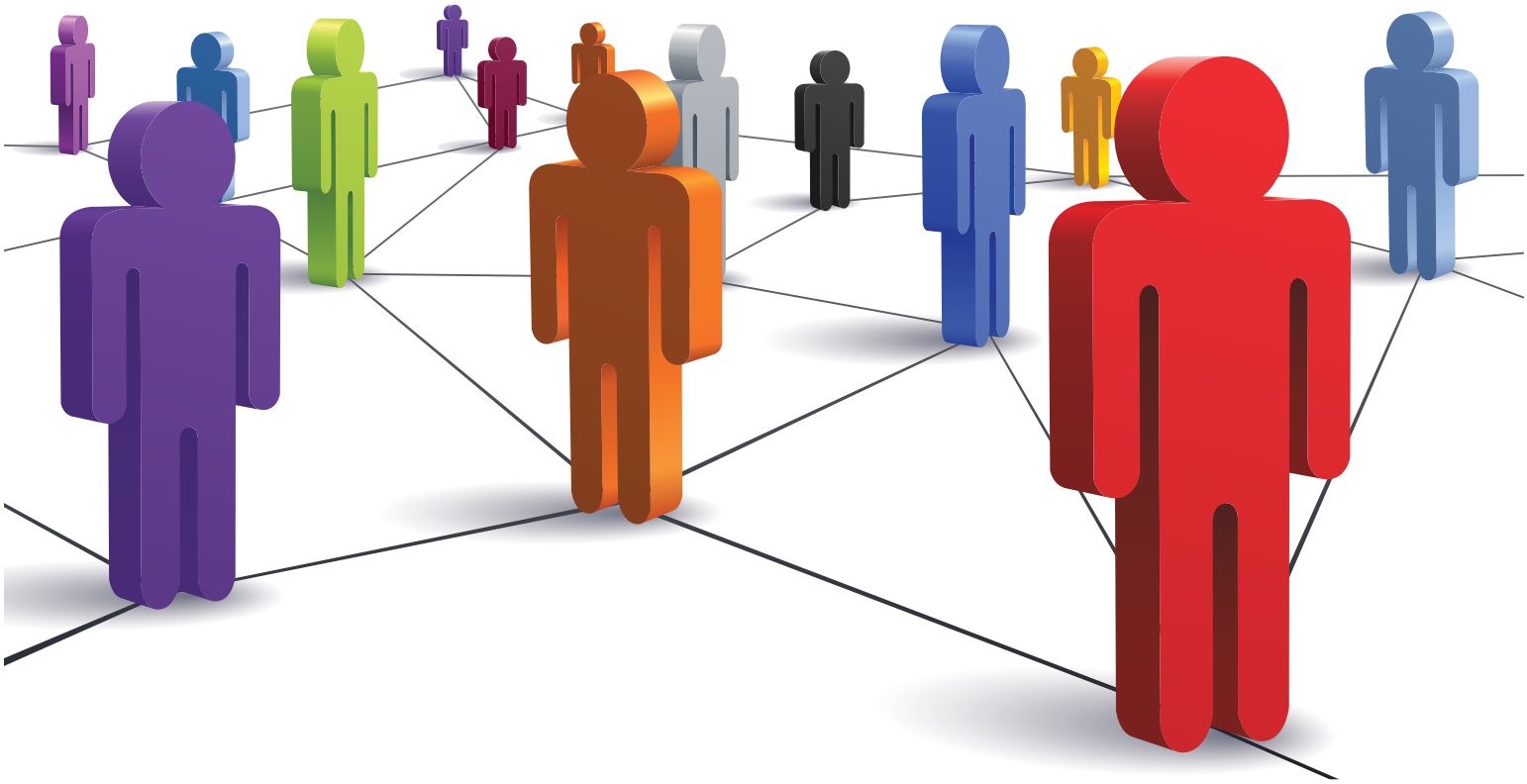


Mobile Voice Radio Communications

By Brian Kopp, The Semaphore Group, Inc.

The Florida Department of Transportation (FDOT) has been using mobile voice radio communications since the 1950s and 60s (when it was known as the Florida State Road Department). This first generation radio system served FDOT very well for 40 years. To adjust to changes in FDOT operations over many decades and to take advantage of new radio technology, FDOT has implemented a successful second generation radio system in all of its Districts. This second generation network greatly improved mobile voice radio communications in each District and modernized the equipment being used. Today, FDOT has begun development of an enhanced version of this voice radio network. This version brings the power of telecommunications network technologies together with the reliable existing radio system to permit a new age of interoperability and co-operation between the Districts, Florida's Turnpike Enterprise, FDOT Central Office, and even other state agency partners, such as the State Emergency Operations Center.

Mobile voice radio communications, like FDOT uses, began in the early 1940s. Public safety, law enforcement agencies put two-way radios in vehicles that allowed officers to talk to their headquarters while on patrol. The Florida State Road Department deployed radios in state vehicles to permit yard personnel to communicate with field forces and to permit communication between vehicles. State Road Department District operations were decentralized and road crews dispatched from many yards in each District. For communications, yards typically had a base station radio with a pole-mounted antenna at a height of approximately 60 feet. They could talk reliably with the road crews in the radio-equipped vehicles out to a distance of 10-15 miles. The only District-wide communications possible was by relay from one yard or vehicle to the next. There were multiple radio channels available so the Districts did not, in general, interfere with each other.

In the 1980s and 90s, FDOT began studying how to take advantage of industry improvements in mobile voice radio communications technologies. Like many industries, the computer age allowed the mobile radio industry to add many new features and capabilities and to improve reliability and maintainability. In addition, in many Districts, local maintenance operations became somewhat centralized. As yards were combined, road crews had greater radiuses of operation. This meant the first generation mobile voice radio system would become less effective when a yard wanted to communicate with its road crews.

FDOT's second generation mobile voice radio communications system was designed and implemented with the idea of giving each District complete wide area mobile voice radio coverage. In this design model, any road crew vehicle, yard office, or District headquarters office can communicate with each other anywhere in the District. The technology required was substantial. FDOT was able to leverage the statewide infrastructure of microwave network towers that were originally installed for the motorist aid callbox system. These towers were used to deploy the necessary mobile voice radio antennas at much higher heights than 60 feet, and with much greater density than the number of yards in a District. A more technologically advanced type of base station radio, called a repeater, had to be used at these tower locations to permit an entire District to hear even the weakest signal in some rural corner of the District coming from a road crew vehicle. In addition, these tower site repeaters had to be tied together so that, even if the road crew vehicle signal was heard by more than one repeater, only the best signal was actually repeated to all areas of the District.

This second generation system has also addressed issues related to the reliability of public utilities, especially in rural locations or during severe weather events. The second generation system was built using FDOT's own microwave network to tie District repeater sites together, as opposed to leasing commercial telecommunications circuits in each District. This not only saves on operational expenses, but ensures that FDOT is fully aware of any issues regarding network connectivity. In rural locations and during severe weather events, commercial power can be unreliable. The second generation mobile voice radio network is deployed at FDOT's microwave network sites where both back-up batteries and propane generators are installed. Power at these high technology, best-in-class locations may run for two weeks without refueling. These special features help ensure that FDOT's mobile voice radio communications system is always operational, especially when it is needed most, before, during, and after severe weather events.

Over the past 10 years, FDOT has completed the statewide deployment of this second generation mobile voice radio communications system. It is fully operational and the Districts are now fully empowered to leverage this tool for all of their communications needs with their crews and yards throughout the entire District; some Districts have even reduced cellphone use by switching some communications to this new system. It must be noted that during this build-out period, FDOT did not stand still. New challenges for mobile communications have presented themselves to FDOT. FDOT has been able to successfully leverage industry technology to address any challenges and to work out a strategy toward a new network that builds on the second generation network, rather than replace it.

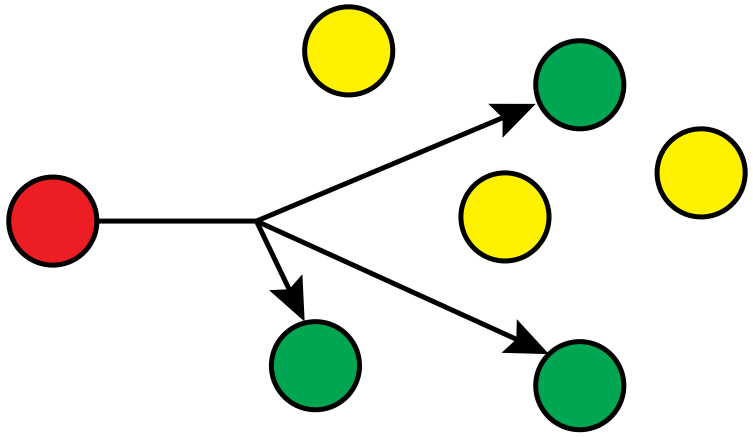
As intelligent transportation systems (ITS) technologies continue to be deployed, the business of facilitating the movement of people and products continues to be optimized at every level of FDOT's operation. It is inevitable that District-centric data usage and operations will continue to expand, crossing boundaries in the process and permitting the Districts to support each

other. The Districts are already communicating with each other in this way and mobile voice radio communications is one of the tools that can be used to provide real-time support between Districts.

In the years since September 11, 2001, there has been a strong push in public safety communications towards a new concept called interoperability. The word is defined differently depending on the application, but for FDOT's mobile voice radio communications it means permitting the Districts to communicate with themselves, other Districts, Florida's Turnpike Enterprise (FTE), and other partner agencies. The concept helps address a common gap in communications – how to communicate across the agency and also with partner agencies during a major event—manmade or natural. This is no small feat and the current second generation technology in FDOT's mobile voice radio communications system needs enhancement to make interoperability a reality. For the past three years, FDOT has been investigating various telecommunications network technologies that can support this idea of interoperable communications while at the same time leveraging the investment in FDOT's second generation mobile voice radio communications system. The most promising technology brings analog voice communications into the world of computer networks and is called Voice over Internet Protocol (VoIP). When voice radios, not voice telephones, are the source of the analog voice communications, the technology is usually called Radio over Internet Protocol (RoIP).

Whether it is VoIP or RoIP, the general idea is to convert the analog voice and any necessary control signals to digital form where it can be sent over a computer network and recreated at the far end as analog voice again. The use of the computer network in between permits interoperability to be achieved without significant difficultly. The statewide ITS network is the computer network that makes this possible for FDOT. This is the same network used by each District today for its own mobile voice radio communications. What is different for interoperability is that the statewide ITS network can easily interconnect the digitized voice radio traffic of one District with that of another.

To deploy this concept in an efficient way, FDOT has adopted the use of a networking protocol called multi-cast. This protocol ensures that even though many end users may be engaged in a voice conversation together, the bandwidth of the statewide ITS network is still used efficiently. In traditional VoIP and RoIP a digitized copy of the voice conversation is sent over the network to each end-user. If the number of end-users doubles, the network bandwidth needed must double. With multi-cast, only one copy of the conversation is sent out to the end users and they all share it,



no matter how many end users there are. This more advanced and more efficient means of carrying an interconnected mobile radio conversation requires more advance networking equipment; FDOT is continually evaluating equipment and both operational and maintenance procedures to ensure the success of their multi-cast deployments.

The use of multi-cast in support of interoperable mobile voice radio communications is now a reality for FDOT. In the fall of 2015, an interoperability connection was established between Districts Two and Three, and the State of Florida Emergency Operations Center (EOC). With this connectivity, a road crew working in Jacksonville to assess a damaged bridge after a hurricane can be monitored in real-time by the Districts Two and Three headquarters, FDOT Central Office, and the State EOC. This level of simultaneous situational awareness will ensure, for instance, that resources are positioned as fast as possible and that the impact on traffic flow in adjacent Districts can be assessed quickly. Within the first few months of 2016, it is anticipated that both District Five and the FTE will join this first mobile voice radio communications system interoperability network. To simplify the name, FDOT has coined the term "Statewide Radio Bridging Network" or SRBnet for short.

This new version of FDOT's mobile voice radio communications system added an important interoperability feature to the communications tools available to the Districts. The technological achievements of the second generation mobile voice radio communications system will continue to support FDOT's operations, but with this new, generation 2.5, interoperable version of the system, FDOT will be able to more easily support the expanding impacts of modern, intelligent transportation.

For information, please contact Mr. Randy Pierce at (850) 410-5608 or email to Randy.Pierce@dot.state.fl.us.

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ITS Florida Awards

By Sandra Beck, ITS Florida

The Intelligent Transportation Society of Florida (ITS Florida) held its annual meeting in December 2015 in Jacksonville. At that meeting, awards were announced during the Awards Banquet with the following results.

ITS Champion – Jeff Sheffield
This award is given to an individual, who has made significant contributions to advance the cause of intelligent transportation systems (ITS) in Florida. This was awarded to Mr. Jeff Sheffield, Executive Director, for the North Florida Transportation Planning Organization (TPO). The North Florida region has an advanced ITS program that is the envy of many throughout the country. Due to Mr. Sheffield's leadership, the North Florida TPO has:

- Invested in the technology needed to manage traffic
- Provided funding to hire a North Florida TPO System Manager consultant who assisted local agencies in the design and management of many projects
- Helped secure over $10 million for the design and construction of the 25,000-foot regional transportation management center (RTMC)

ITS Professional of the Year – Craig Carnes
This award is to recognize a person who has contributed significantly to the ITS community during 2015. Mr. Craig Carnes, Metric Engineering and the Florida Department of Transportation (FDOT) District Two RTMC Consultant Project Manager, was awarded this honor as ITS Professional of the Year. Mr. Carnes has held a fundamental role in FDOT District Two including:

Craig Carnes accepting award from Ken Jacobs and Connie Braithwaite.

- Design/build Requests for Proposal
- ITS Maintenance Programs
- Incident Management Programs
- Strategic Highway Research Program-II training courses
- Key participant in statewide 511 Working Group Meetings, ITS Working Group Meetings, and Statewide Change Management Board team
- Testing and analysis of new ITS devices
- Prime developer of the Federal Highway Administration-required Concept of Operations for a Systems Engineering Management Plan documents
- Co-Chair ITS Florida's Technical Committee

Certificate of Outstanding Achievement – FDOT Central Office
The FDOT Central Office was awarded the Certificate of Outstanding Achievement for its data sharing partnership with Waze. This partnership provides for free data sharing. The purpose of the agreement allowed both parties to use and publish data received from each other. They also agreed to provide attribution to the other party when publishing their information. This partnership provides a cost-effective way to incorporate a new, needed traffic incident data source into the SunGuide® software and Florida 511 as well as letting the Waze mobile app be an additional traveler information distribution channel.

ITS Member of the Year – North Florida TPO
The North Florida TPO was awarded the ITS Member of the Year. Executive Director, Mr. Jeff Sheffield, explained the purpose of a multi-agency RTMC to the North Florida TPO Board and asked them to fund the construction of this facility for the North Florida region. The Board earmarked over $10 million dollars for the design and construction of a 25,000-square foot facility that would incorporate the FDOT RTMC operations staff, Florida Highway Patrol dispatchers,

Jacksonville Sheriff's Office dispatch, Jacksonville Fire/Rescue dispatch, City of Jacksonville Traffic Signals Operations, and Jacksonville Transportation Authority Transit dispatch.

Outstanding Achievement – FDOT District Four with Florida International University

The Outstanding Achievement was awarded to FDOT District Four in partnership with Florida International University (FIU) in the development of a traffic data simulator designed and developed to generate real-time traffic sensor data that is representative of actual traffic flows in express lanes segments.

Ken Jacobs and Connie Braithwaite presenting award to District Four.

This simulation software, which FDOT District Four will make available to all Districts within Florida, has many potential applications in the context of express lanes implementation, operations, and maintenance, including the following:

- Testing express lanes traffic data processing
- Testing express lanes pricing algorithm implementation
- Testing responsiveness pricing algorithm to changes in traffic flow
- Testing impact and efficacy of potential pricing algorithm configuration changes
- Express lanes software demonstration and operator training

Outstanding Achievement – FDOT District Six

The FDOT District Six ITS Office was awarded an Outstanding Achievement for the control room redesign of their RTMC to improve its internal workflow and enhance the traffic services it provides to South Florida drivers on a daily basis.

Ken Jacobs and Connie Braithwaite presenting award to District Six.

The retrofit remained on budget and was completed within the 60-day contract period without affecting the traffic service drivers depend upon on a daily basis. The results of this redesign show that the District understands the varying factors that can influence operations and how they can be improved to increase quality output. It shows the District's commitment to creating multi-pronged and innovative solutions that promote the program's ability to increase the safety and mobility of our highways. To communicate the benefits of this effort to the public, the District also created an electronic marketing kit that included a time-lapse video, a press release, and a fact sheet.

Certificate of Appreciation – Jay Calhoun

Mr. Jay Calhoun was awarded a Certificate of Appreciation for his tireless commitment as a co-chair for the inaugural ITS 3C Summit. His efforts greatly enhanced member value to ITS Florida as well as ITS Georgia and Gulf Region ITS. His leadership, combined with the efforts of nearly 30 member volunteers from the aforementioned chapters, raised awareness for the industry, forged new collaborative efforts across the southeastern United States, and netted over $30,000 for ITS Florida. The business model and reputation established through this effort provides a foundation for future generations.

Certificate of Appreciation – Alicia Torrez

Ms. Alicia Torrez, Public Information Specialist at the FDOT District Six ITS Office, was awarded the Certification of Appreciation for her outstanding success in leading customer service efforts and educating the public on the benefits of ITS resources and managed lanes projects in South Florida. Ms. Torrez serves the District's ITS Office as the lead public information specialist for the SunGuide RTMC. She leads a support staff of one assistant and one graphic designer in finding new and innovative ways to reach the District's customers and ensure they understand the mission, vision, and values of District Six and its ITS resources.

For more information on ITS Florida, please check the ITS Florida web site at www.ITSFlorida.org or contact Ms. Sandy Beck, Chapter Administrator, at ITSFlorida@ITSFlorida.org.

If you wish to contribute an article to the *SunGuide® Disseminator* on behalf of ITS Florida, please email Ms. Stephanie Hoback at Stephanie.Hoback@Wavetronix.com or Sandy Beck.

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Editorial Corner: Operations Academy™ - A Total Immersion Course

By Jeremy Dilmore, FDOT District Five, and Melissa Gross, VHB

The Operations Academy™ (provided by the University of Maryland's Center for Advanced Transportation Technology) bills itself as, "total immersion in the subject of transportation management and operations, using a mix of classroom instruction, workshops, and analysis of existing systems to ensure the retention of the principles being presented." While this is true it does not paint the whole picture. Left out are the relationships built from a variety of different professionals from other states, the feeling that someone else understands the daily struggles involved in working in operations, and the heaping amounts of food that are more like a cruise than a training.

The most recent Operations Academy took place on November 3-13. It was hosted, as always, at the Maritime Institute in Linthicum Heights, Maryland, just outside of Baltimore. Florida was well represented with participation by Jeremy Dilmore, District Five; Eric Gordin, Florida's Turnpike Enterprise; Melissa Gross, VHB; and Dan Smith, District Four, four out of the 37 attendees. Other attendees came from as far away as Alaska, California, and Nevada to as close as a hometown attendee from Maryland's own Coordinated Highways Action Response Team (a joint effort of the Maryland Department of Transportation, Maryland Transportation Authority, and the Maryland State Police responsible for freeway operations).

The Operations Academy is an intensive two weeks. Sunday was the only "free day" and the group worked through the Veteran's Day holiday. Homework was provided most nights requiring working from 8 a.m. to 8 p.m. with an hour for lunch and an hour for dinner as a general rule. The training was broad-ranging, including Planning for Operations, Freight Operations, Connected Vehicle, Traffic Incident Management, Capability Mature Model, Safety, Performance Measures, Data Visualization, and many more.

Two class projects were based on analyzing a fictitious Lincoln Department of Transportation, an organization with District-led intelligent transportation systems groups, which needed to be merged into a statewide group, by conducting a Capabilities Maturity Model (CMM) Assessment. The first project included understanding the level of maturity and where the organization was on the development of a formalized transportation systems management and operations (TSM&O) program based on provided information. The second included providing a series of recommendations on how to change the organization to grow and mature the program into a statewide effort with a higher level of maturity across the six dimensions of the CMM.

While the conversation constantly moved toward each participants' own organization and generally focused on opportunities for improvement, it became evident that no one organization is a shining example of perfection. Instead, organizations share

similar challenges and some offer case studies of best practices that can be brought back to the Florida Department of Transportation (FDOT) to improve the program.

Florida has a number of advantages and strengths. First, the state has a strong investment in the TSM&O program. There are identified funds for operations and maintenance. While sometimes it seems the funding is tighter than the ambitions of the program, it remains unique that funding is identified and directed within FDOT's Work Program for operations work. Second, as the program adds a focus on arterials to the freeway mix, it appears to be ahead of most other states. Utah has a strong program and was well represented, but Florida is not far behind. Third, Florida's general financial health and comfort in working with consultants is a model for stability moving forward. Other states are experiencing serious funding issues and grappling with workforces that are not as flexible as those in Florida. Fourth, Florida's climate and being a right-to-work state prevent some of the most vexing issues facing states, predominantly in the northeast. Their primary function appears to be handling snow events. Additionally, there was a lot of discussion about union rules and being unable to adjust their workforce.

The Operations Academy did offer challenges that the State of Florida can take on to provide a model for other departments of transportation (DOT) to follow. First, FDOT procurement and internal roles, like those at other DOTs, places a glass ceiling on non-professional engineers (PE), despite the fact that electrical engineers, programmers, network administrators, and database administrators are conducting work. Traditionally, these professionals either do not get or are not eligible for PE licenses; however, other certifications and standards of achievement could be recognized to ensure that FDOT gets the best of the best from industry.

Second, it seems all DOTs are struggling with the change to TSM&O and integrating planning and operations. FDOT is experimenting with different roles and responsibilities for planning and operations. This experimentation should continue until a model is found that accomplishes the marriage between these two groups to best meet the needs of the public.

Third, as an organization, Florida has adopted performance measures that reflect all aspects of transportation. While this is state-of-the-practice, the next step is to adjust District targets from in-process measures, such as how many contracts were let and how many consultants were hired, to more performance-based metrics, such as how much delay there is in the system and how many tons of freight reached their destinations. This focus will allow for innovation and continue to place Florida in a leadership position as FDOT brings TSM&O into its everyday work.

All in all, FDOT is in a good place, but we need to continue to progress to keep our place as a national leader. All of FDOT's Districts and Central Office undertook separate CMM exercises. From this, the Districts have developed plans for the implementation of TSM&O. Florida is set to revisit the TSM&O Strategic Plan, with most, if not all, of its previous elements achieved. The Operations Academy attendees look forward to bringing what we gained from the academy to the development of the strategic plan to ensure it is multidimensional and continues the growth and success of TSM&O in Florida.

For information, please contact Mr. Jeremy Dilmore at (386) 943-5360 or e-mail to Jeremy.Dilmore@dot.state.fl.us.

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Announcements

Welcome Jeff

The Florida Department of Transportation (FDOT) State Traffic Engineering and Operations Office is pleased to announce the appointment of Jeff Frost to the position of Incident Management/ Commercial Vehicle Operations Program Manager. Jeff comes to FDOT from the Florida Highway Patrol (FHP) where he worked in the Bureau of Commercial Vehicle Enforcement as a Public Affairs Officer and District Lieutenant. Prior to FHP Jeff worked for FDOT's Office of Motor Carrier Compliance as an officer, sergeant, and lieutenant from 1995 until the merger with FHP in 2011. Jeff brings over 20 years of enforcing commercial vehicle laws and regulations.

In his new position Jeff will serve as the Chair of the Commercial Motor Vehicle Review Board, and will oversee the Traffic Incident Management/ Road Ranger Programs and the Commercial Vehicle Information Systems and Network grant component from the Federal Motor Carrier Safety Administration.

Please join us in welcoming Jeff to his new assignment.

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FDOT Traffic Engineering and Operations Mission and Vision Statements

Mission:

Provide leadership and serve as a catalyst in becoming the national leader in mobility.

Vision:

Provide support and expertise in the application of Traffic Engineering principles and practices to improve safety and mobility.

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