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|  | Florida ITS Architecture Support and Maintenance ProjectDistrict 2 RITSA Conversion Report (ARC-IT 9.0) Version 1.0 |

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# Introduction

This Architecture Conversion Report records the District 2 Regional Intelligent Transportation System (ITS) Architecture (RITSA) conversion from its reference in the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) Version 8.3 to ARC-IT Version 9.0. This report addresses the results of the conversion process.

# Conversion Process

The architecture conversion process uses the Regional Architecture Development for Intelligent Transportation (RAD-IT) software Version 9.0 to convert the architecture to be compatible with ARC-IT Version 9.0. The process includes the following steps to accomplish the conversion.

* Architecture conversion: Conversion features in RAD-IT Version 9.0 convert the architecture database schema to be compatible with RAD-IT Version 9.0 and aligned to reference ARC-IT Version 9.0 content.
* Conversion analysis: Conversion information is produced by RAD-IT for the architecture conversion noting the changes made. The conversion information notes the schema and content changes, such as service splits or consolidations, element divisions, and information flow adjustments. Analysis is required for each converted item to assess the appropriateness of each change for the architecture. For example, the addition of the new CVO05 Commercial Vehicle Parking service involves the division of the Parking Management System element into two new elements, namely the Parking Area Equipment and Parking Management Center elements. These new elements along with the new CVO05 service are applicable to all eight Florida ITS Architectures requiring analysis and update of the architectures to accommodate the new ARC-IT content.

A substantial change that ARC-IT Version 9.0 imposes on the Florida ITS Architectures during conversion is the reorganization of the standards associated with each information flow in each of the architectures and their associated projects. The reorganization introduces solutions which associate sets of standards that are required to address an interface or information flow implementation. The conversion process does not provide the solutions information automatically. The standards solutions were populated with default selections and the selections were analyzed for their applicability for the architecture and each project. In the RAD-IT software, the Standards tab in the user interface is now the Communications tab.

* Architecture content update: The intent of the conversion process was to maintain the alignment of the converted Architecture content to the greatest extent possible with the pre-conversion Architecture content. As noted above, element physical object mapping changes, service package changes, information flow additions and adjustments, and the evolution of the standards mappings in ARC-IT Version 9.0 required changes to be made to the Architecture content. Unless it was necessary, no additional changes beyond those required to align the pre-conversion and converted architecture content were made. During the course of the Annual Architecture Maintenance Update, ARC-IT Version 9.0 features that could be considered as additional information to the Architecture will be assessed.
* Architecture website posting: The converted architecture will be posted to the Florida ITS Architecture website.

# Architecture Conversion Results

The District 2 RITSA was converted to be compatible with ARC-IT Version 9.0. The following sections highlight the changes made to the architecture as a result of the conversion process.

## Architecture Inventory Elements

Table 1 provides conversion results for architecture inventory elements impacted by the conversion process. The table information shows the element impacted, the results of the element conversion, the analysis disposition which may indicated a revision to the conversion results depending on the architecture content, and the notes of the conversion implementation.

Table 1 Conversion Analysis of Inventory Elements

| **Element in Source Architecture** | **Element in Converted Architecture** | **Conversion Disposition** | **Conversion Notes** |
| --- | --- | --- | --- |
| City of Gainesville Parking System. Mapped to: * Parking Management System
 | City of Gainesville Parking System. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Management Center’ Physical Object as the information flows are related to the ‘Parking Area Equipment’ Physical Object. | No service package changes required. |
| City of Jacksonville Parking System. Mapped to: Parking Management System | City of Jacksonville Parking System. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object as the information flows are related to the ‘Parking Management Center’ Physical Object. | No service package changes required. |
| City of St. Augustine Parking Management System. Mapped to: * Parking Management System
 | City of St. Augustine Parking Management System. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object.  | No service package changes required. |
| Jacksonville International Airport System. Mapped to: * Parking Management System
* Alternative Mode Transportation Center
 | Jacksonville International Airport System. Mapped to: * Parking Management Center
* Alternative Mode Transportation Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object. Add a new ‘Parking Area Equipment’ element with appropriate flows in the PM01: Parking Space Management (Jacksonville International Airport) and the PM03: Parking Electronic Payment (Jacksonville International Airport) service packages. | Added ‘Jacksonville International Airport Parking Area Equipment’ element and information flows in the PM01: Parking Space Management (Jacksonville International Airport) and the PM03: Parking Electronic Payment (Jacksonville International Airport) service packages. |
| JTA Park-and-Ride Lots. Mapped to: * Parking Management System
 | JTA Park-and-Ride Lots. Mapped to: * Parking Management System
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object. Add a new ‘Parking Area Equipment’ element with appropriate flows in the PM01: Parking Space Management (All Parking Facilities) and the PM03: Parking Electronic Payment (All Parking Facilities) service packages. | Added ‘JTA Park-and-Ride Lots Parking Area Equipment’ element and information flows in the PM01: Parking Space Management (All Parking Facilities) and the PM03: Parking Electronic Payment (All Parking Facilities) service packages. |
| North Beaches Parking System. Mapped to: * Parking Management System
 | North Beaches Parking System. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Management Center’ Physical Object as the information flows are related to the ‘Parking Area Equipment’ Physical Object. | No service package changes required. |
| Private/Public Parking Systems.Mapped to: * Parking Management System
 | Private/Public Parking Systems. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object. Add a new ‘Parking Area Equipment’ element with appropriate flows in the PM01: Parking Space Management (All Parking Facilities) and the PM03: Parking Electronic Payment (All Parking Facilities) service packages. | Added ‘Private/Public Parking Facility Operators Parking Equipment’ element and information flows in the PM01: Parking Space Management (All Parking Facilities) and the PM03: Parking Electronic Payment (All Parking Facilities) service packages. |
| FDOT Truck Parking Management System.Mapped to: * Parking Management System
 | FDOT Truck Parking Management System. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object. Add a new ‘Parking Area Equipment’ element with appropriate flows in the CVO05: Commercial Vehicle Parking (FDOT Truck Parking Management System) service package which will replace the existing PM04: Regional Parking Management (FDOT Truck Parking) service package. | Added ‘FDOT CVO Parking Area Equipment’ element and information flows in the CVO05: Commercial Vehicle Parking (FDOT Truck Parking) service package which will replace the existing PM04: Regional Parking Management (FDOT Truck Parking) service package. |

## Architecture Services

Table 2 provides conversion results for architecture services impacted by the conversion process. The table information shows the service impacted, the results of the service conversion, the analysis disposition, and the notes of the conversion implementation.

Table 2 Conversion Analysis of Services

| **Service in Source Architecture** | **Service in Converted Architecture** | **Conversion Disposition** | **Conversion Notes** |
| --- | --- | --- | --- |
| PM04: Regional Parking Management (FDOT Truck Parking) | PM04: Regional Parking Management (FDOT Truck Parking) | Replace PM04: Regional Parking Management (FDOT Truck Parking) with CVO05: Commercial Vehicle Parking (FDOT Truck Parking). Add a ‘Parking Area Equipment’ element and an interface with appropriate flows to the ‘FDOT Parking Management System’ in CVO05.  | Added ‘CVO05: Commercial Vehicle Parking (FDOT Truck Parking)’ service package. Removed the ‘PM04: Regional Parking Management (FDOT Truck Parking)’ service package. Added ‘FDOT Truck Parking Area Equipment’ element and information flows. |
| TM12: Dynamic Roadway Warning (Connected Vehicle Wrong-Way Driving) | TM12: Dynamic Roadway Warning (Connected Vehicle Wrong-Way Driving)  | Replace TM12: Dynamic Roadway Warning (Connected Vehicle Wrong-Way Driving) with TM25: Wrong Way Vehicle Detection and Warning (Connected Vehicle Wrong-Way Driving) service package. | Added TM25: Wrong Way Vehicle Detection and Warning (Connected Vehicle Wrong-Way Driving). Removed TM12: Dynamic Roadway Warning (Connected Vehicle Wrong-Way Driving). |
| TM12: Dynamic Roadway Warning (FDOT Wrong-Way Driving) | TM12: Dynamic Roadway Warning (FDOT Wrong-Way Driving)  | Replace TM12: Dynamic Roadway Warning (FDOT Wrong-Way Driving) with TM25: Wrong Way Vehicle Detection and Warning (FDOT Wrong-Way Driving) service package. | Added TM25: Wrong Way Vehicle Detection and Warning (FDOT Wrong-Way Driving). Removed TM12: Dynamic Roadway Warning (FDOT Wrong-Way Driving) service package. |

## Architecture Functional Requirements

The functional requirements were reviewed in the converted architecture for any changes resulting from conversion. No requirements in the RITSA were affected by the conversion.

## Architecture Information Flows

During the conversion process, 145 new information flows were added to the interface tab in the RAD-IT software but were not added to the architecture. This makes these new flows available for future tailoring based on stakeholder needs or requests but did not change the architecture content represented by the pre-conversion architecture.

Additional information flows were added to the architecture database related specifically to the *roadway equipment coordination* information flow. The roadway equipment coordination information flow was replaced in ARC-IT Version 9.0 with 14 specific information flows, including:

|  |  |
| --- | --- |
| * advisory radio coordination
* barrier system coordination
* dynamic sign coordination
* environmental sensor coordination
* lane management coordination
* local priority request coordination
* passive vehicle monitoring coordination
 | * reversible lane coordination
* roadway warning coordination
* signal control coordination
* traffic detector coordination
* traffic metering coordination
* vehicle occupancy coordination
* video surveillance coordination
 |

Each instance of the *roadway equipment coordination* information flow replacement was reviewed based on the services it supported in the original RITSA and decisions on which new information flows to use as replacements were based on the service analysis. The results of the interface analysis are as follows as applied to each source-destination pair affected.

City of Gainesville Field Equipment and Alachua County Field Equipment

* Local priority request coordination
* Passive vehicle monitoring coordination
* Signal control coordination
* Traffic detector coordination
* Video surveillance coordination

Alachua County Field Equipment and FDOT District 2 Field Equipment

* Local priority request coordination
* Passive vehicle monitoring coordination
* Traffic detector coordination
* Video surveillance coordination

Alachua County Field Equipment and University of Florida Field Equipment

* Local priority request coordination
* Passive vehicle monitoring coordination
* Signal control coordination
* Traffic detector coordination
* Video surveillance coordination

City of Gainesville Field Equipment and FDOT District 2 Field Equipment

* Dynamic sign coordination
* Traffic detector coordination
* Vehicle occupancy coordination
* Video surveillance coordination

City of Gainesville Field Equipment and University of Florida Field Equipment

* Local priority request coordination
* Passive vehicle monitoring coordination
* Signal control coordination
* Traffic detector coordination
* Video surveillance coordination

City of Gainesville Field Equipment and Alachua County Field Equipment

* Local priority request coordination
* Passive vehicle monitoring coordination
* Signal control coordination
* Traffic detector coordination
* Video surveillance coordination

City of Jacksonville Field Equipment and FDOT District 2 Field Equipment

* Dynamic sign coordination
* Environmental sensor coordination

City of St. Augustine Field Equipment and St. Johns County Field Equipment

* Dynamic sign coordination
* Passive vehicle monitoring coordination
* Reversible lane coordination
* Signal control coordination
* Traffic detector coordination
* Video surveillance coordination

FDOT District 2 Field Equipment and University of Florida Field Equipment

* Local priority request coordination
* Passive vehicle monitoring coordination
* Traffic detector coordination
* Video surveillance coordination

## Architecture User Defined Information Flows

The conversion process can generate information flow alternatives for user defined flows in the original architecture. Where these information flow alternatives were available, they were reviewed against the user defined flows in the architecture for potential replacement. This is a manual process requiring comparison of the user defined information flows with alternatives. In many cases, the user defined flows exist between inventory elements that are not functionally supported by the physical object pairs and selected services. In those cases, the user defined flows were retained. Where information flow alternatives provided an exact replacement, the user defined flows were replaced with the ARC-IT information flows. An example of a user defined information flow that was revised during conversion is provided in Table 3. While some of the user defined information flows in the RITSA were analyzed and addressed where appropriate, due to the large number of user defined information flows in the RITSA, a more thorough analysis will be conducted during architecture maintenance activities to address the flows that should be replaced.

Table 3 User Defined Information Flow Change Example

| **Source Element** | **Destination Element** | **User Defined Flow** | **ARC-IT Flow** |
| --- | --- | --- | --- |
| City of Jacksonville Traffic Management Center | City of Gainesville Regional Transit System | road weather information\_ud | road weather information |

## Standards

ARC-IT Version 9.0 reorganized the standards associated with each information flow. The reorganization introduces solutions which associate sets of standards for consideration to address an interface or information flow implementation. During the conversion process, standards solutions are not automatically converted. The auto-selection function was used to populate the standards solutions associated with the architecture interface content. The standards solutions selections were reviewed for consistency with the pre-conversion architecture. While additional standards information is now available in the converted architecture, the information was found to be appropriate for each interface to support system design considerations and decisions. The following is an example of the type of standards information now available in the architecture.

**Source Element:** FDOT District 2 RTMC

**Destination Element**: County and City Roadway Maintenance and Construction Systems

**Information Flow**: emergency traffic control information

**Standards Solution**: TMDD - NTCIP Messaging

**Solution Description**: This solution is used within the U.S. It combines standards associated with US: TMDD with those for C-C: NTCIP Messaging. The US: TMDD standards include upper-layer standards required to implement center-to-center communications with traffic management systems. The C-C: NTCIP Messaging standards include lower-layer standards that support partially secure communications between two centers as commonly used in the US.

**Solution Readiness**: Moderate-Low

**Solution Issues**: Data not fully defined (medium)

* Some of the data elements for this information flow are not fully defined.
* Center-to-center information for signal preemption and priority are not defined.

## Projects

Each project in the architecture was analyzed for impacts from the conversion process. No projects were impacted by the conversion process.