DOE Award DE-FC02-05CH11351

Development of an Integrated Distribution Management System

Final Report
October 2010

Southern Company Services
600 North 18th Street
Birmingham, AL 35203

Principal Investigator
J. Schatz

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Abstract / Executive Summary

This final report details the components, functionality, costs, schedule and benefits of developing an Integrated Distribution Management System (IDMS) for power distribution system operation. The Distribution Automation (DA) and Supervisory Control and Data Acquisition (SCADA) systems used by electric power companies to manage the distribution of electric power to retail energy consumers are vital components of the Nation's critical infrastructure. Providing electricity is an essential public service and a disruption in that service, if not quickly restored, could threaten the public safety and the Nation's economic security. Our Nation's economic prosperity and quality of life have long depended on the essential services that utilities provide; therefore, it is necessary to ensure that electric utilities are able to conduct their operations safely and efficiently.

While the demand for both the amount of electricity and the reliability of that electric supply continues to grow, financial pressures on electric utilities continue to mount. Utilities are finding capital and operating cost constraints on power distribution businesses, while needing to upgrade and enhance operations. Balancing this growing demand with cost control is becoming increasingly complex. Southern Company's operating companies (hereinafter "Southern") have in the past utilized various aspects of DA to help manage the distribution system for improved operations and for cost control and is among the industry leaders in DA functions. As demands grow on the distribution system, Southern must expand distribution operation capabilities to acquire and act on analytical information, such as system loading, while ensuring power quality, managing appropriate Distributed Energy Resources (DER), and dealing with the pressing concerns of national security.

To address these needs, Southern has integrated over 4000 Remote Terminal Units strategically located in Power Distribution devices and presently has over 200 DER devices under its operational control at customer locations. Moreover, Southern has implemented a state-of-the-art communications infrastructure to link these devices. A fully integrated technology of applications is needed to link these various remote sensing and communications devices with other information tools that help guide Power Distribution Operations.

A fully implemented IDMS will provide this, a seamlessly integrated set of applications to raise electric system operating intelligence. IDMS will enhance DA and SCADA through integration of applications such as Geographic Information Systems, Outage Management Systems, Switching Management and Analysis, Operator Training Simulator, and other Advanced Applications, including unbalanced load flow and fault isolation/service restoration. These apps are capable of utilizing and obtaining information from appropriately installed DER, and by integrating disparate systems, the Distribution Operators will benefit from advanced capabilities when analyzing, controlling and operating the electric system.

With IDMS in place, Southern will be able to optimize distribution system performance, model and predict load profiles, perform contingency analysis based on operational load flow, immediately pinpoint the location of outages, quickly analyze re-routing of power flows, remotely and automatically switch circuits to restore power as rapidly as possible and formulate means to keep regions powered through intentional islanding while utilizing various DER technologies.

Southern is poised to design and implement IDMS, using the extensive sensor and communications infrastructure at over 2200 DA sites in place at Alabama Power Company consisting of Distribution substations and Distribution line devices. These devices include line monitors, switches, reclosers, regulators, capacitors and DER. This project final report covers the details associated with preparing and presenting the prototype technologies and associated full product definition for this full application. This includes the components, functionality, costs, schedule and benefits of IDMS and also represents the commitment and experience of Southern to implement the IDMS project.

Project Description

The project scope is to develop and demonstrate the principal concepts and prototypes required for modernizing and operating the next generation Distribution System through the implementation of an Integrated Distribution Management System (IDMS). IDMS will be the integrated platform that will tie together the functions of operating an electric power distribution system and will; enhance power reliability and power quality; ensure maximum utilization of power system assets; facilitate rapid service restoration following outages; advance the level of distribution system security; demonstrate Distributed Energy Resources (DER) applications for distribution grid enhancements and; provide for training of distribution system operators to ensure electric power distribution keeps pace with growing demands and technology evolutions.

The Distribution Automation (DA) and Supervisory Control and Data Acquisition (SCADA) systems used by electric power companies to manage the distribution of electric power to retail energy consumers are vital components of the Nation's critical infrastructure. Providing electricity is an essential public service and a disruption in that service, if not quickly restored, could threaten the public safety and the Nation's economic security. Our Nation's economic prosperity and quality of life have long depended on the essential services that utilities provide; therefore, it is necessary to ensure that electric utilities are able to conduct their operations safely and efficiently.

Fully functioning IDMS will provide a seamlessly integrated set of Advanced Distribution Automation and Operations applications that raise electric system operating intelligence, and it is a logical technology development and progression to Southern's, and many other nationwide utilities', DA and SCADA systems. IDMS will enhance DA and SCADA through integration of applications such as Geographic Information Systems (GIS), Outage Management Systems (OMS), Switching Management and Analysis, Operator Training Simulator, and other Advanced Applications, including unbalanced load flow and Fault Isolation and Service Restoration (FISR). All of these applications, along with others that will be described later, are capable of obtaining information from and utilizing DER installations, and by integrating all of these disparate systems, the Distribution Operators will benefit from advanced capabilities when analyzing, controlling and operating the electric system.

As one of many functions, IDMS will be used to identify areas along a feeder, or as an aggregated load at the substation, which are overloading or are migrating towards overload condition. The advanced applications of IDMS will then be used to determine the preferred method of relieving the imminent overload or congested situation. Upon complete analysis, recommended actions that the operator can take will be submitted and displayed. This capacity limitation and congestion avoidance scheme will be able to incorporate demand response activities such as dynamic reconfiguration, load response applications and where appropriate, DER dispatch through the advanced SCADA applications.

Southern has demonstrated the use of pricing signals and "demand elasticity" to reduce system loading and demand, but in the past these reduction mechanisms have targeted transmission relief and generation limitations, not distribution assets. With IDMS, demand response will be targeting applications for reducing congestion and constraints on the distribution network. These applications will identify load shifting possibilities through reconfiguration, dispatch of available DER systems and optimizing the voltage profile to reduce losses.

The Volt/VAR Control (VVC) application is also included as a part of IDMS. This application will be used to optimize and improve the voltage quality while also providing reactive power support for the interconnecting transmission and even distribution systems. VVC will demonstrate the ability of numerous devices incorporated on the distribution network to function appropriately within the given constraints of the network, customer loading, available resources and the other distribution equipment.

As an integral part of the IDMS package, a means to identify and recommend feeder reconfiguration for optimization or contingency situations will be available for the distribution operator's utilization. This reconfiguration capability will allow an appropriately installed DER device to operate in an islanding situation, with the distribution operator having ultimate control over the switching and islanding condition. The islanding capability is made possible by an optimal switching order that is an essential and primary function of the day-to-day needs and responsibilities of the IDMS platform. This application, though necessary for operating a DER in an intentional islanding fashion, achieves its greatest value from the ability to rapidly restore service and reconfigure in a fashion which is most advantageous to the customers and the distribution system.

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Along with the development and demonstration activities described above and in details to follow, IDMS will exhibit the necessary infrastructure and system understanding associated with installed DER. Southern has been involved with the deployment, validation and demonstration of numerous DER technologies including:

- Advanced Battery Energy Storage Systems
- Microturbines
- Fuel Cells
- Advanced Technology Reciprocating Engines
- And other DER technologies

Through these demonstrations and evaluations, Southern has realized many applications that could benefit through DER integration, but only where it makes since to the utility and/or the end-user of the technology. As a part of this project, Southern company will demonstrate applications that support the integration DER into the IDMS product, including dispatch and modeling.

The two core functions defining IDMS are the "Distribution Model" of the electric power distribution system and the "Electronic User Environment." The Distribution Model is a database containing the attributes needed to support the various applications of the IDMS. These include the traditional Distribution Automation telemetry values, the data represented on the "Map Board", the impedances of the various segments of line, transformer characteristics and the identification of the customers they serve, limits of the various assets, protective device characteristics and operating philosophies of switched capacitors and locations and characteristics of DER. It is through the Distribution Model that the data are "integrated."

The second core function of IDMS is the Electronic User Environment (EUE). The EUE is an improved method of conveying information, rather than raw data to the operations personnel (and others as might be desired). The integrated software elements will provide a "common look" and the interaction with the software elements take on a common method of interaction conveying the information available in a manner that does not overwhelm the operator. This is especially important during the times when the operations personnel experience wide spread outages.

A Distribution Outage Management System (OMS) provides the operators with a means of centrally collecting and coordinating information about outages (planned and unplanned) on the power system. The Trouble Call function (unplanned outages) analyzes customer calls and other information to assist the operator in determining the most likely point at which a customer outage occurred. In a storm situation where outages occur to several thousand customers, an OMS is essential to assist operators in managing the customer calls and coordinate the restoration processes.

The switching management function (planned interruptions) handles the requests from maintenance crews and work planners for outages on specific parts of the network. The Distribution Operators will assess these requests by running a power flow analysis to determine the impact of the planned outage along with any other known anomalies for any given time or scenario.

The IDMS will make full use of all available SCADA data to enhance outage analysis and provide a real time status of network switching activities. The Outage Management function utilizes network analysis tools to determine the effect on the network for any outage or proposed switching operation. Also, Basic Crew Monitoring functionality will be included in the product covering truck type and location, crew personnel listing, search capability to locate crews, task scheduling.

The main display will be a geographic view of the real-time network model, which combines information from the SCADA system and OMS. The various applications are shown graphically in Figure 1.

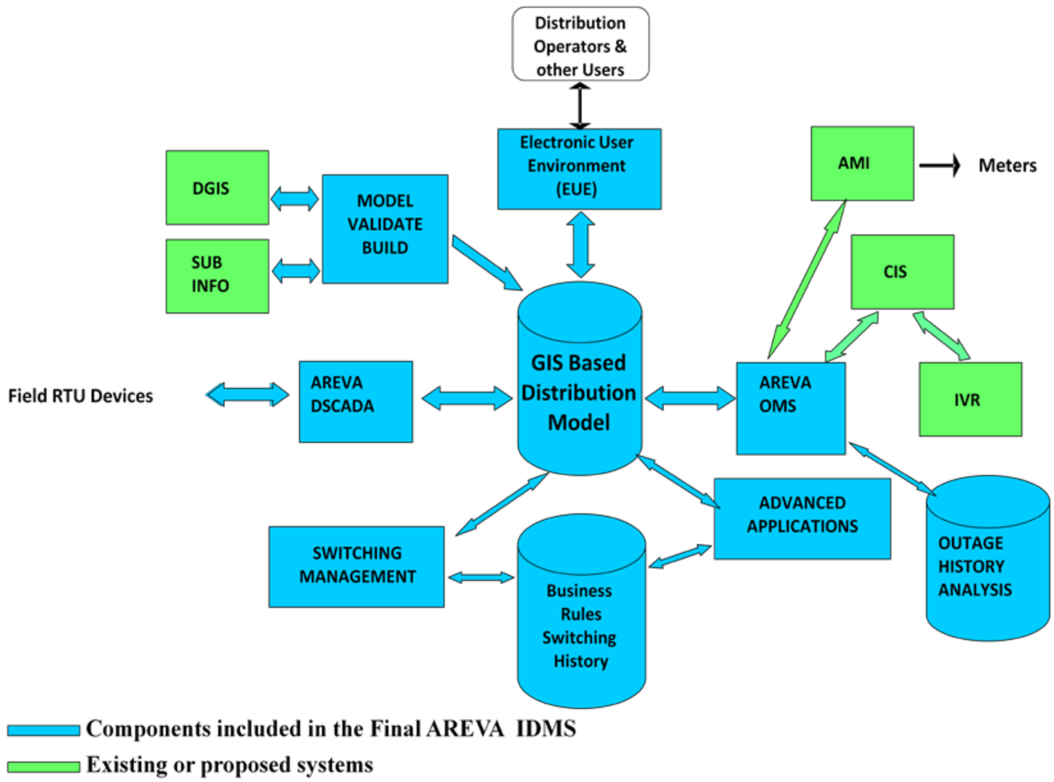


Figure 1 – IDMS Infrastructure

Overview of the Project and Final Report

This is the Final Report of the Integrated Distribution Management System Project and includes completed project information, expenditures to date and future plans. The project had the initial go ahead given by DOE while under negotiations with the contracting phase. Work initiated in March of 2006 in a limited fashion while the overall contract was being negotiated and the overall prototype designs were being developed since then.

The "Key Deliverables" that are part of the Integrated Distribution Management System project include:

1. Develop a proof of concept of IDMS which can be integrated with an Outage Management System (OMS), SCADA, electronic switching, and advanced applications

- *IDMS functionality requirements were defined for 30 functional components. Coded prototypes were developed for these 30 functional components and were integrated into the core DMS product. Examples:*
    - *Network View-User Interface: Display of electrical components, network topology processor, tracing the network, temporary modifications (cuts, jumpers, grounds) and tagging,*
    - *Network Analysis: Distribution power flow, short circuit analysis, feeder reconfiguration*
- *This development concluded with an integrated demonstration and testing period at the conclusion of this phase and was accepted by the IDMS Lead and Architect.*

2. Deliver Substation Editor solution
    - *Solution accepted by the IDMS Architect in June 2008 (as defined in the original scope).*
3. Develop Requirements for all of the Prototype items noted in Application Section
    - *Initial Development Plans and Updated Development plans were completed for all items that remained within scope of the project.*
4. Begin development of advanced applications as noted in the Application Section
    - *Initial development plans, prototypes and updated development plans were accepted for all advanced applications in scope for this phase.*
5. Develop simulated interfaces to external systems
    - *These were developed and successfully implemented by AREVA*
6. IDMS design of the platform
    - *Design was accepted. This will be a 64 bit, Windows OS*
7. Reliability and Performance criteria
    - *A Reliability and Performance Requirements document was developed by the IDMS Architect, accepted by AREVA and baselined.*
8. Initiate interface design discussions with IT for interface to AMI, ARMS, CSS, IVRs.
    - *A workshop was conducted with IT to initially define the interfaces. Initial and Updated Development Plans for the interfaces were developed by AREVA and approved by IT and the IDMS Lead and Architect.*

These deliverables are not progressive activities and many activities that make up these deliverables required them to be developed and worked on simultaneously and in a parallel fashion.

The following table represents the applications that were developed as prototypes and evaluated for inclusion and validity in this phase of the IDMS application.

1	AREVA's Distribution Management Solution
1.1	The Distribution Model Centric Design
1.1c	Multiple AOR assignment for DNOM Device
1.2	System Software
1.3	RNMS Sub System
1.4	SCADA Sub System
1.6	Unified Web-based UI
1.7	Modeling & Program Development System
1.8	System Hardware Architecture
1.9	System Interfaces
1.9.4	CIS - OMS Interface (includes Case Notes from OMS to CSS
1.9.6	Internal Interactive Voice Response - OMS Interface
1.9.7	External Interactive Voice Response - OMS Interface
1.9.8	AMR - OMS Interface
1.9.9	Workforce Management - OMS Interface (ARMS)
2	Network SCADA Exchange
3	Distribution Network Operations Model
3a	Model Management Environment
3b	Substation Editor
4	Network View – User Interface
4.1	Display of Electrical Components and other Geo. Objects
4.1a	Crew Truck Symbol, Crew Type, Number of Crewman
4.1b	Tooltip: Number of customers
4.1c	Area World View
4.1d	Representation of mobile substations
4.1e	Safety documents (including construction cards) in free-space
4.1f	Manual scaling of font sizes
4.1g	Moving temporary graphic objects, text, and tags
4.1h	Display single phase de-energization on a multiphase line
4.1i	Line Coloring in Substation by Voltage Level
4.1j	Hide/show layers on geographic
4.1k	Search for device based on customer information.
4.1m	Information notes (Post-It-Notes) in free-space
4.1n	Wild card search capability for names and IDs of devices
4.1o	Partial Model View showing geographic adjacency
4.2	Network Topology Processor
4.2a	Feeder Coloring//Tracing into the substation
4.4	Temporary modifications (Cuts, Jumpers, Temporary Switch, and Grounds)
4.4b	Tagging of Cuts
4.5	Tagging
4.5a	Symbology Finalization
7	Switching Operations (including Archive and Reports)
7b	Ability to derive a list of customers about to be de-energized
7c	Alignment with Alabama Power operational switching requirements
7.1	Creation and Execution of Switching Orders
8	Network Analysis
8.1	Distribution Power Flow
8.1a	Validation of Current Capacitor Position
8.1b	Harmonics De-rating
8.1c	Switching Order Simulation
8.4	Short Circuit Analysis
8.4b	Short Circuit Analysis Protection Validation
8.4c	Short Circuit Analysis Protection Coordination
8.6	Feeder Reconfiguration
8.6a	Study Mode FISR (Distribution Contingency Analysis)
8.6b	Planned Outage Study Return to Normal Problem Formulation

Table 1 – IDMS Prototype Applications Being Developed

As these applications were tested and signed off as completed and accurate, the activities moved into further definition and development plans for the next phase of the IDMS project as indicated in the next steps section.

Following are some of the progressive accomplishments which were reported on the Integrated Distribution Management System throughout the progressive reporting periods in the development cycle of the IDMS application:

- Functional specification and definition made on the various applications, and sub-applications that make up the first stage of the IDMS.
- Development plans completed through design sprints.
- Reviewed and approved design at numerous stages throughout the project.
- Prototyped multiple screens in applications including correct and required symbology, display of appropriate temporary modifications and feeder coloring and tracing.
- Completed the analysis, including security requirements, project estimate and project work plan and the sponsor approved the analysis package.
- Reviewed infrastructure requirements and identified the need for 64 Bit applications environment and demonstrated prototypes in this environment.
- Created prototypes and development plans for multiple operator views including an area world view, partial model view and number of customer view.
- Developed a prototype of the substation editor.
- Constructed the development data base.
- Completed test plan templates and partial system test plans.
- Completed wild card search mode for the distribution operator
- Completed prototypes of Short Circuit Analysis Protection and Coordination and Study Mode for Fault Isolation and Service Restoration
- Development of Free space information notes
- Integration of Model Substation Editor to build the internal models
- Network View User Interface
- Display of Electrical Components
- Modeling of Distributed Resources
- Voltage/VAR Control with Demand Reduction
- Network topology Processor
- Tracing of the Network
- Display of Temporary Conditions and Modifications (jumpers, cuts, grounds, etc.)
- Distribution Power Flow
- Network Analysis
- GIS Extract tool was built to extract and convert GIS data into XML Format for the IDMS Model

The above accomplishments kept the project moving at the scheduled paced and the project was demonstrated, with almost all deliverables already completed and integrated, to the Department of Energy on site on April 7, 2009.

Much of the anticipated accomplishments around the prototype development of IDMS were to show the real capabilities that might be achieved with a common user interface and a tightly integrated system. This was accomplished as a part of this overall demonstration on April 7, 2009 that was conducted using these prototypes developed.

Benchmark Test Overview

On April 7, 2009 a demonstration of the IDMS at its current state in the prototype phase was conducted at Alabama Power Company Headquarters. The benchmark that was a part of this demonstration is given below and indicated by the types of integration and information exchange that is to take place in the overall IDMS once fully developed and deployed. Following is an outline of the activities and demonstrations:

General description of the overall IDMS Prototype tools:

- Symbology
- Configurability
- GIS model files
- Substation editor
- Wild card Search

Script which **simulates** a fault while displaying the following user interface screens:

- Geographic
- SCADA alarms
- SCADA one line
- OMS screens

When fault is simulated, all impacted devices:

- Operate
- Component and line haloing occurs
- SCADA alarms trigger
- OMS displays the resulting outages.

Demonstration of the following Advanced Apps:

1. Fault Isolation and System Restoration (FISR) – (this isolates the Fault placed above)
    - Placing a Fault in SIM
    - Using "Potential Fault" and "Fault Indicator" halos in RT to locate
    - Place located fault in RT
    - Run FISR

    This also demonstrates the complexity of Plan Ranking (with weighting parameters)
    - Pull Plan into Switch Order (set break point)
    - Execute Switch Plan
    - Isolate Fault

2. Volt VAR Control – Voltage Management – Reactive Area Support
    Demonstrate problem of Low Power Factor on station
    Utilize “Reactive Area Support” formulation
  Demonstrate the Voltage and PF of network objects on feeder prior to executing plan
    Show VVC Plans
    Show Plan Details
    Execute Plan (in this case, closing about 20 Capacitors)
  Demonstrate the resulting Voltage and PF changes on network objects
  Discuss future possibility of “Closed Loop Mode” where PF correction will be fully automated

3. Demonstrate “Copy Dynamics to Study”
    Pull the dynamics of the previously solved VVC case
    Initialize to Real Time

4. VVC – Voltage Management – Loss Minimization
    In Study Mode
    Run problem formulation
    Show VVC Plans
    Show Plan Details
  Demonstrate that Loss Minimization will re-open some of the Capacitors previously closed for PF correction
    Execute Plan
  Demonstrate the resulting Flows

5. Distributed Generation
    One Substation with two Distributed Generation Sources
      Windmills
      Storage Batteries
    Demonstrate the “Analyst Output Values” of each type of DG, showing source and sinking KVA

IDMS Operator Views

Although it is very difficult to get a complete understanding of software applications without going through an actual live demonstration, an attempt is made to show a few screens from different applications that a distribution system operator would utilize and a brief example of what was seen through demonstration. Following are various screen shots of the IDMS prototypes that are in development or completed. Figure 2 indicates the views available in either the SCADA view or the DMS view of the same substation. Different information is required by the operator depending on the current state and operator requirements.

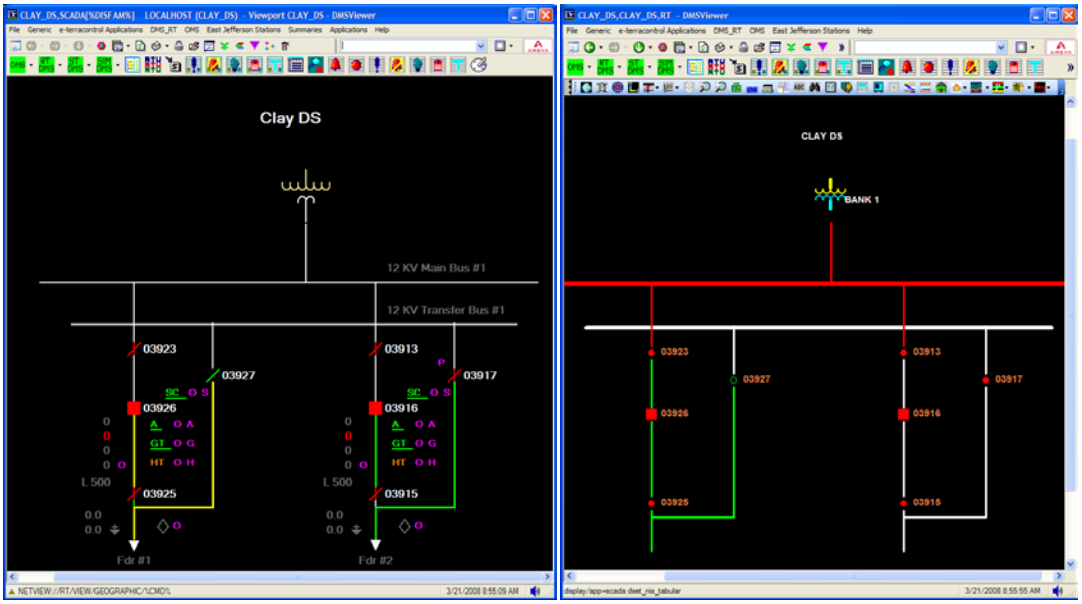


Figure 2 - SCADA and DMS Views of Substation Display

Figure 3 is a SCADA view of a substation that indicates the one line display of a substation and shows through various colors the loops and conductor paths associated with the feeders into and out of the substation.

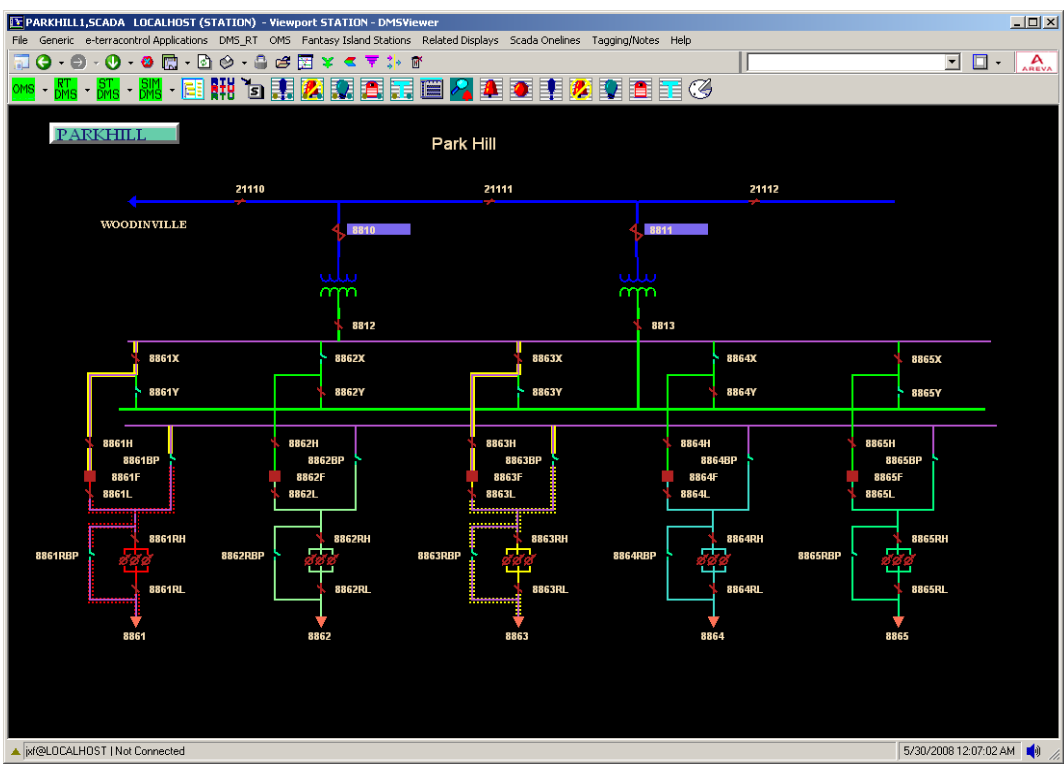


Figure 3 – SCADA One-Line Display w/ Looped Color

Figures 4, 5 and 6 are screen shots of an application that identifies a fault, determines and displays which breaker or breakers have operated and shows the fault current magnitude. This is an initial demonstration of advanced applications that are being developed to identify the exact fault location, isolate the faulted area or section, and then automatically restore service to any customers that are not included in the area that was isolated.

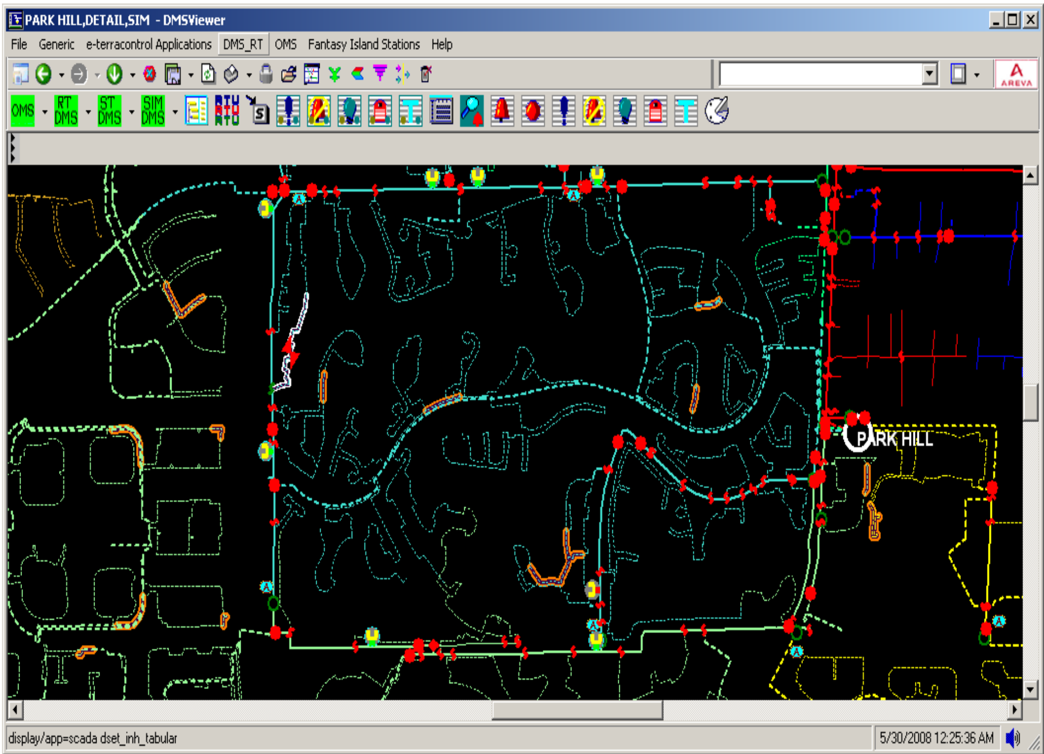
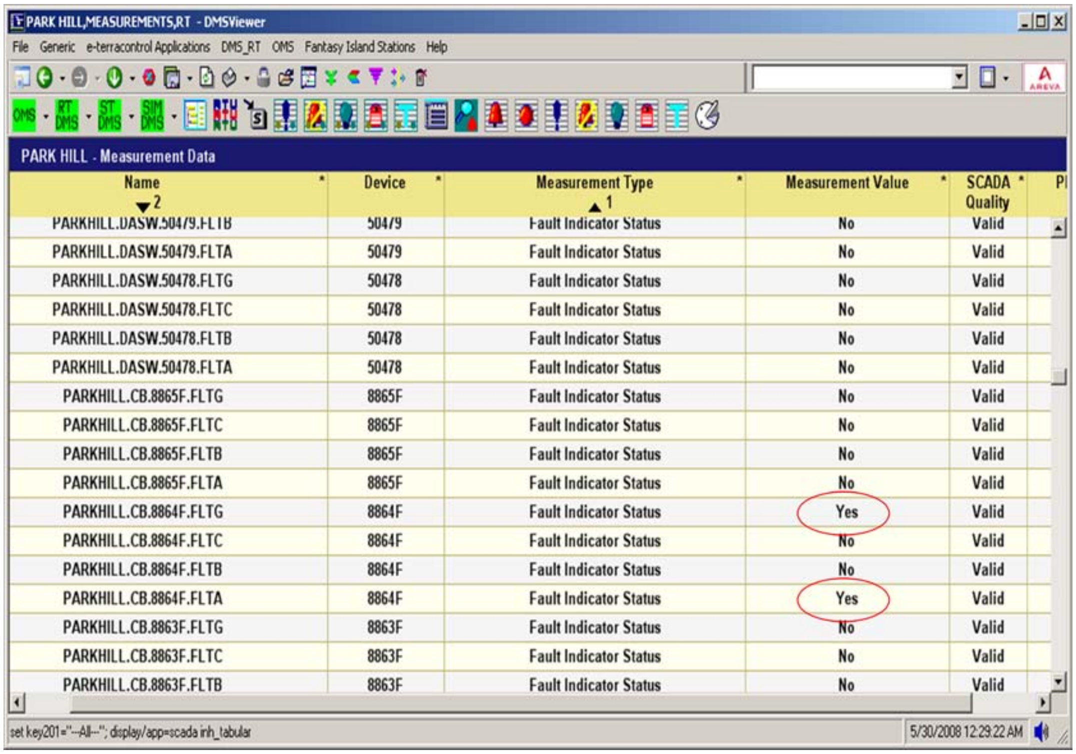
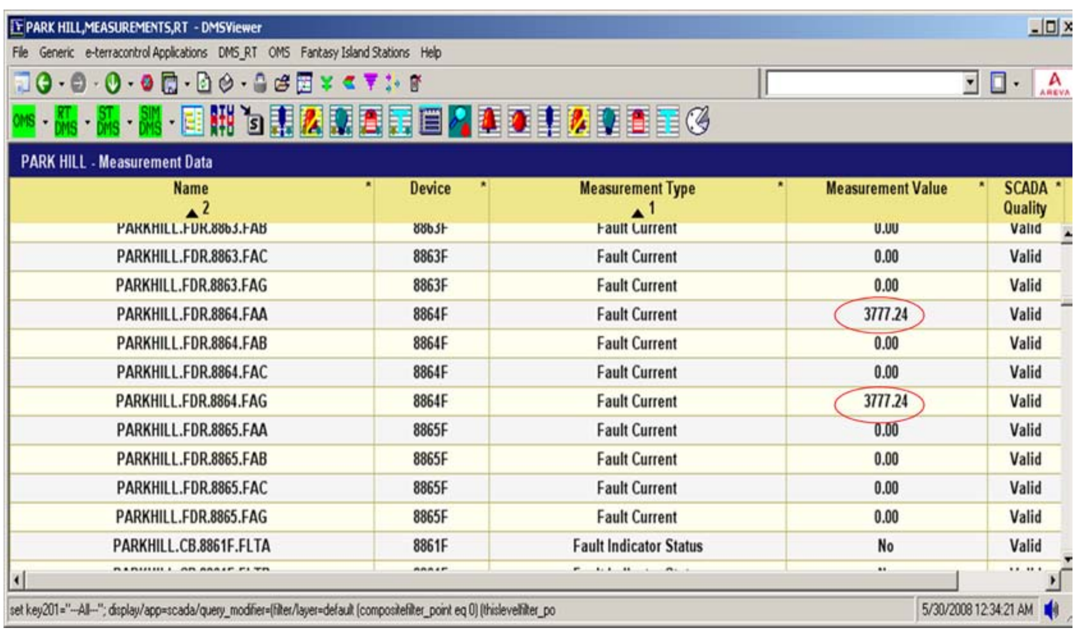


Figure 4 – Single Phase to Ground Fault Indicator



Name	Device	Measurement Type	Measurement Value	SCADA Quality
PARKHILL.DASW.50479.FLTB	50479	Fault Indicator Status	No	Valid
PARKHILL.DASW.50479.FLTA	50479	Fault Indicator Status	No	Valid
PARKHILL.DASW.50478.FLTG	50478	Fault Indicator Status	No	Valid
PARKHILL.DASW.50478.FLTC	50478	Fault Indicator Status	No	Valid
PARKHILL.DASW.50478.FLTB	50478	Fault Indicator Status	No	Valid
PARKHILL.DASW.50478.FLTA	50478	Fault Indicator Status	No	Valid
PARKHILL.CB.8865F.FLTG	8865F	Fault Indicator Status	No	Valid
PARKHILL.CB.8865F.FLTC	8865F	Fault Indicator Status	No	Valid
PARKHILL.CB.8865F.FLTB	8865F	Fault Indicator Status	No	Valid
PARKHILL.CB.8865F.FLTA	8865F	Fault Indicator Status	No	Valid
PARKHILL.CB.8864F.FLTG	8864F	Fault Indicator Status	Yes	Valid
PARKHILL.CB.8864F.FLTC	8864F	Fault Indicator Status	No	Valid
PARKHILL.CB.8864F.FLTB	8864F	Fault Indicator Status	No	Valid
PARKHILL.CB.8864F.FLTA	8864F	Fault Indicator Status	Yes	Valid
PARKHILL.CB.8863F.FLTG	8863F	Fault Indicator Status	No	Valid
PARKHILL.CB.8863F.FLTC	8863F	Fault Indicator Status	No	Valid
PARKHILL.CB.8863F.FLTB	8863F	Fault Indicator Status	No	Valid

Figure 5 – Fault Indicator and Feeder Breakers

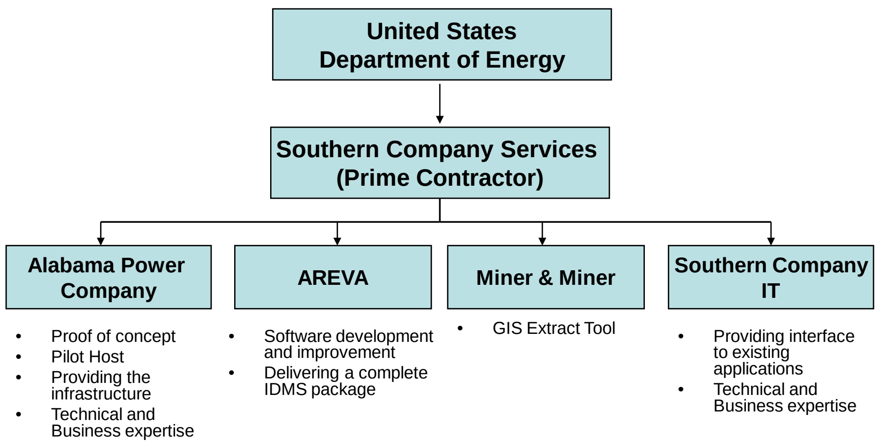


Name	Device	Measurement Type	Measurement Value	SCADA Quality
PARKHILL.FDR.8863.FAB	8863F	Fault Current	0.00	Valid
PARKHILL.FDR.8863.FAC	8863F	Fault Current	0.00	Valid
PARKHILL.FDR.8863.FAG	8863F	Fault Current	0.00	Valid
PARKHILL.FDR.8864.FAA	8864F	Fault Current	3777.24	Valid
PARKHILL.FDR.8864.FAB	8864F	Fault Current	0.00	Valid
PARKHILL.FDR.8864.FAC	8864F	Fault Current	0.00	Valid
PARKHILL.FDR.8864.FAG	8864F	Fault Current	3777.24	Valid
PARKHILL.FDR.8865.FAA	8865F	Fault Current	0.00	Valid
PARKHILL.FDR.8865.FAB	8865F	Fault Current	0.00	Valid
PARKHILL.FDR.8865.FAC	8865F	Fault Current	0.00	Valid
PARKHILL.FDR.8865.FAG	8865F	Fault Current	0.00	Valid
PARKHILL.CB.8861F.FLTA	8861F	Fault Indicator Status	No	Valid

Figure 6 – Fault Current Magnitude

Project Organization, Management and Responsibilities

The IDMS team consists of organizations, entities and personnel that have been involved as leaders in the SCADA and DA applications in the electric utility industry for decades. Following are descriptions of these organizations.



Headquartered in Atlanta, Georgia, Southern Company is a premier super-regional energy company focused on an eight-state "Super Southeast" region. Southern Company is the parent of five operating electric utilities; Alabama Power Company, Georgia Power Company, Gulf Power Company, and Mississippi Power Company, a rapidly growing competitive wholesale generation business, Southern Nuclear, Southern LINC and Southern Company Gas. With over four million retail customers and more than 39,000 megawatts of generating capacity, Atlanta-based Southern Company (NYSE: SO) continues as a leading producer of electricity in the United States.

Southern Company consistently delivers dependable growth, attractive dividends and financial returns that rank in the top quartile of the U.S. electric utility industry. Our family of brands is the region's strongest, reliably serving customers from big cities to rural areas. Low prices, high reliability and great customer service consistently power Southern Company to top rankings in customer satisfaction surveys. Our strategy has been and continues to be to focus on our core business of reliable and low-cost electricity supply to the fast-growing south east region of the United States. Southern Company has more than 500,000 shareholders; its common stock is one of the most widely held in the United States. For more financial information, view the annual report and other financial documents, such as earnings statements, from the Investor Relations section at http://www.southerncompany.com/.

Southern Company Services, Inc

Southern Company Services, Inc. (SCS) is a wholly owned subsidiary and service company of Southern Company. Since 1976, SCS has provided project management services, technical expertise, and a wide range of engineering services to the DOE through a number of contracts and cooperative agreements. With this extensive government contracting experience, SCS will be the contracting entity with the DOE. The Research and Environmental Affairs organization within SCS will provide overall project management including administration of subcontracts, budgets, schedules, and reporting requirements. The SCS technical staff has considerable experience related to the proposed scope of work as described in the Management Team and Key personnel section of this proposal.

Alabama Power Company

Alabama Power Company (APC) is the second largest subsidiary of Southern Company, the nation's largest generator of electricity. Alabama Power, an investor-owned, tax-paying utility, provides the valuable combination of competitive prices, reliable electricity supply and unparalleled service to 1.3 million homes, businesses and industries in the southern two-thirds of Alabama. More than 78,000 miles of power lines carry electricity to customers throughout 44,500 square miles.

APC will be the host site and will provide the guidance and technical and business expertise for the design and Functional Specification of IDMS. APC will also provide the extensive infrastructure of one of the leading DA and SCADA systems in the country.

AREVA T&D

The AREVA Group is a worldwide leader in the energy field with a strong presence in over 40 countries. AREVA provides its customers with technology solutions for the production of nuclear energy and for the transmission and distribution of electricity. AREVA also offers interconnect systems, principally in the telecommunications, computer and automotive markets. AREVA’s 75,000 employees are thus committed to the major challenges of the 21st century: access to energy for everyone, preservation of the planet, and responsibility toward future generations.

AREVA T&D is a world leader in delivering Energy Management Systems. They are a member of the international AREVA T&D group which serves the industrial automation and electrical engineering market worldwide. AREVA T&D develops the SCADA/EMS technology for the worldwide AREVA T&D group out of the Bellevue, Washington office and is the premier software product developer in the international AREVA T&D group.

Their product approach has been well received by the corporate R&D group as they apply all of the rigorous testing required for ISO 9001 certification. This recognition in the corporate group has provided them with the funding required to provide a truly portable system to the market place. As a result of the product and delivery approach, AREVA T&D is the leading supplier of Energy Management Systems in North America. The proposal to this program is based on the software architecture and software development and made in the USA at the Bellevue, WA facility.

Project Information Transfer

There have been numerous presentations on the overall IDMS project including updates to the utility industry at the Electric Power Research Institute (EPRI) meetings, IEEE meetings and conferences, educational settings, and peer review meetings. As a result of the presentations at the EPRI meetings and growing interest that has been generated from these presentations, a Distribution Management Systems Interest Group is being formed by EPRI and is open to all interested parties – whether participating in EPRI or not.

Also, since demonstrations of the technology are the best way to learn of the power associated with an IDMS application, any interested parties are welcome to participate in upcoming demonstrations of the IDMS applications. As follow on project, there will be numerous show and tell opportunities with this project and the follow on activities described at the end of this document.

Project Expenditures

Total recorded project costs through the end of the project are approximately $4,075,623 which includes all labor, expenses and allowable OH and fringe benefits. This is under budget from the original estimate and contracted amount for the complete project which was originally $4,500,000 and the approved split for this complete project estimate and contracted budget was as follows:

DOE Portion	(44.4%):	$2,000,000
Southern Portion	(55.6%):	$2,500,000
Total	:	$4,500,000

Based on these agreed to percentages and the Cumulative Project Costs, the final budget breakdown is as follows:

DOE Portion	(44.4%):	$1,808,344
Cost Share	(55.6%):	$2,267,280
Total	:	$4,075,624

Next Steps

The IDMS prototypes have been validated and next steps include completion of the follow on DOE supported OE projects DE-FC26-07NT43183 - Integrated Distribution Management System in Alabama and includes a complete development and deployment of the complete IDMS system with many advanced applications. The Amended follow on project mentioned above carries the IDMS concept all the through to full deployment across the Alabama Power Company service territory. This project is a multi-year activity and will run into 2012. This includes complete functionality of Fault Isolation and System Restoration, Crew Location, a complete Distribution Operator Training Simulator (DOTS), Distribution Energy Efficiency Program, Full Volt/VAR Control, Protection Validation and many more advanced applications.

The overall IDMS user environment will be accessible to not only the operators, but to engineering and analyst personnel as well, although only in a view mode. Along with this capability, the DOTS is viewed as one of the leading off-line tools to come from this project since the smart grid environment has no accessible training tools available to operators which include the new overall approach and capabilities of a reconfigurable system and incorporated DER. As a part of the deliverables associated with these projects, demonstrations and showcase events will take place at the Alabama Power headquarters in 2011 and 2012.