

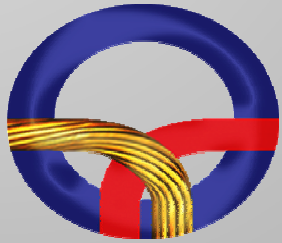


**GCC Interconnection Authority**

**Project Management**  
**GCC Interconnection Project**

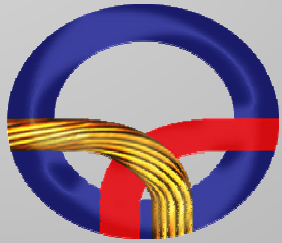
Saleh H. Al-Awaji, PhD

*March 2007*

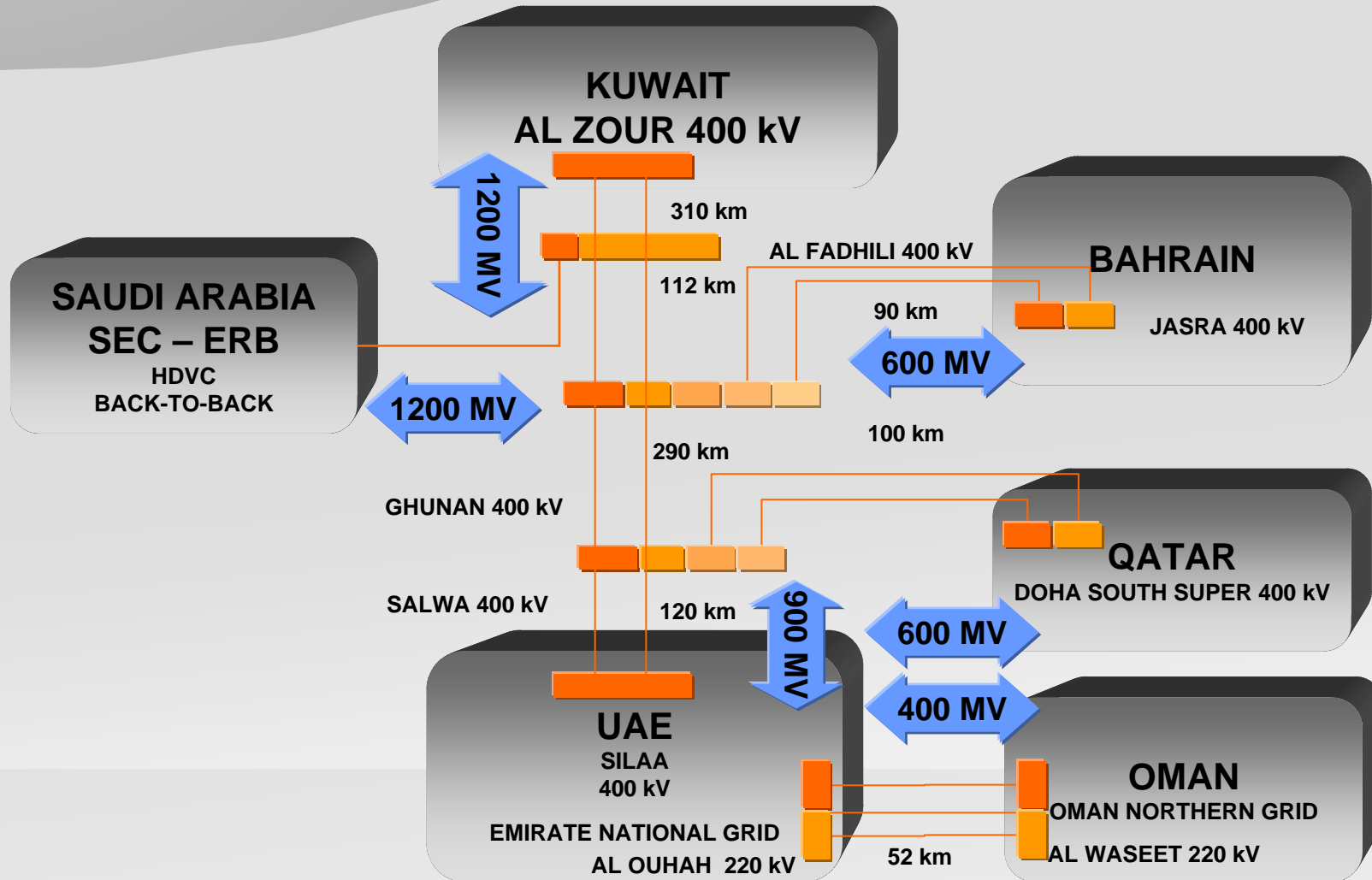


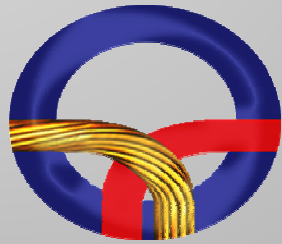
# Project Background

- Gulf Cooperation Council (GCC) between Kuwait, Saudi Arabia, Bahrain, Qatar, United Arab Emirates and Oman formed in 1981
- Recognized benefits of interconnection of electricity grids of the countries
- Initial study in mid-eighties
- Preliminary project definition study in 1990 confirmed technical, economic and financial feasibility, recommended formation of GCC Interconnection Authority
- GCCIA established in 2001
- Project technical, economic and financial feasibility updated in 2003/04
- Countries decided to self-finance project in 2004
- Project tendered and awarded in 2005

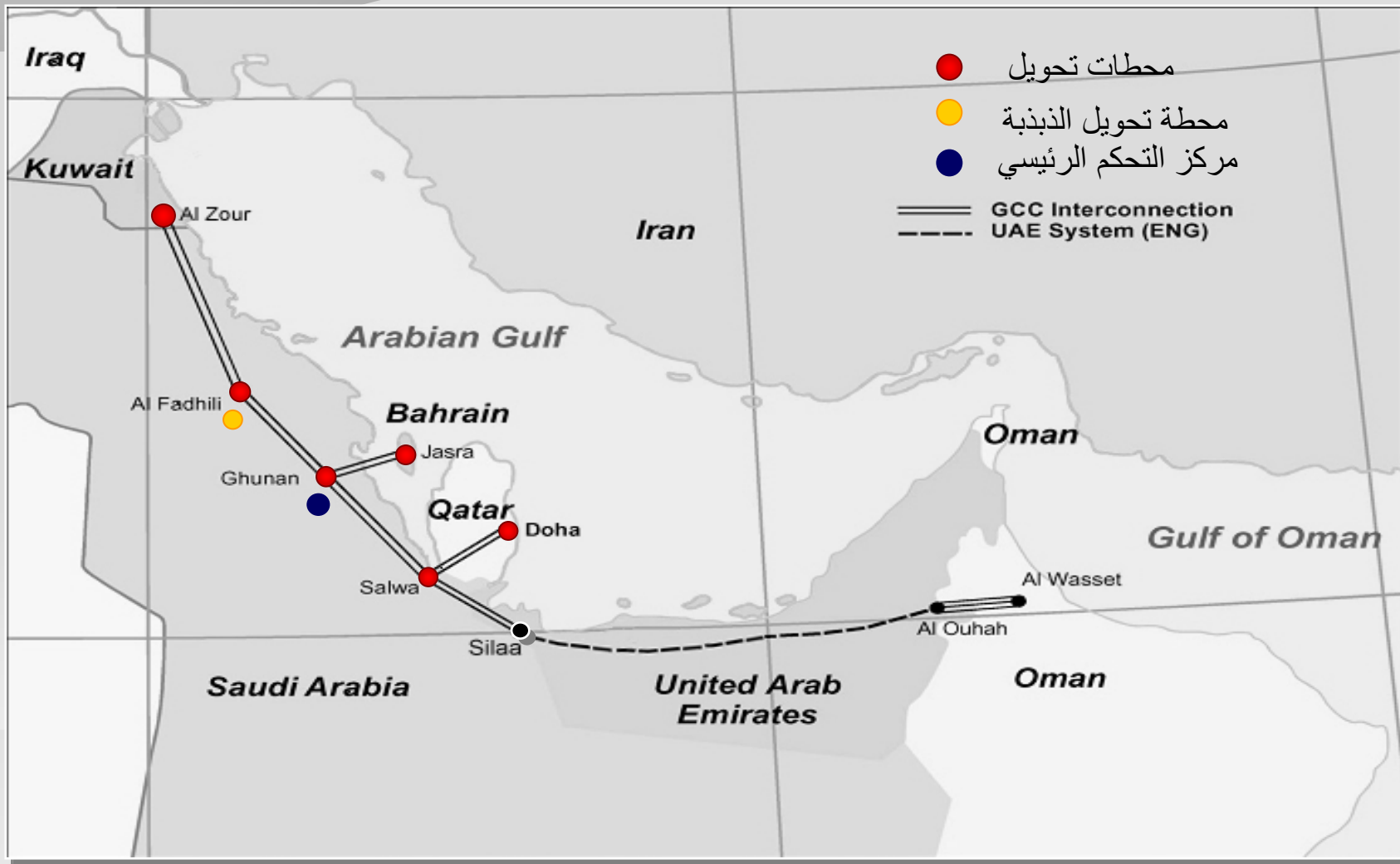


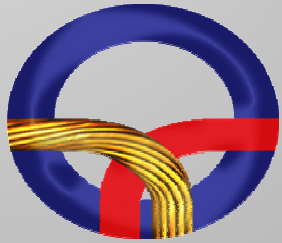
# Conceptual Diagram of the Interconnection System





# Approximate Route and Layout of the GCC Interconnection





# Phase I Development Plans

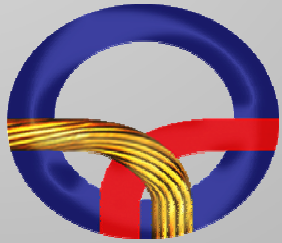
- Kuwait
- Saudi Arabia-ERB
- Bahrain
- Qatar
- Year of Interconnection → 2008

## Phase II Development Plans

- UAE – Formation of Emirates National Grid
- Oman – Formation of Oman Northern Grid

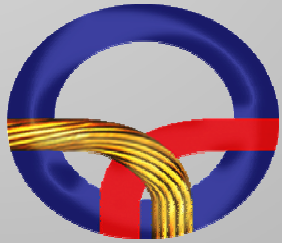
## Phase III Development Plans

- UAE
- Oman
- Year of Interconnection → 2010



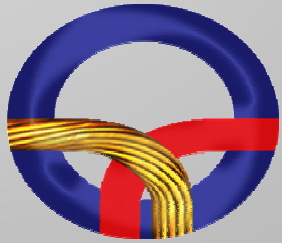
# Pre-Qualification Process

- Announcement to all interested bidders to participate in pre-qualification exercise in 2004
- All bidders were requested to fill out and submit pre-qualification form with their company credentials
- A total of 91 bidders requested pre-qualification forms
- 63 companies submitted forms and credentials
- 45 companies were pre-qualified



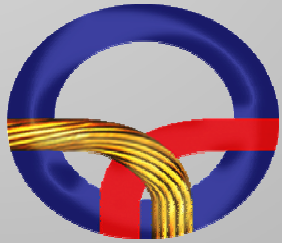
# Tendering & Adjudication Process

- Invitations to Tender based on FIDIC conditions for Plant and Design Build were sent to the 45 pre-qualified bidders
- 5 Tenders received for GIS substations
- 3 Tenders received for back-to-back HVDC station
- 19 Tenders received for overhead transmission lines
- 3 Tenders received for submarine and land cable
- 4 Tenders received for control, protection & SCADA and telecommunication system



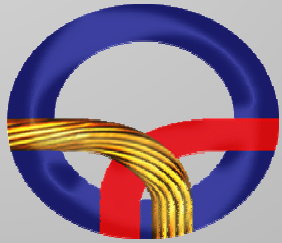
# Evaluation Process

- Tenders evaluated for Technical conformance and then Commercial evaluation was performed
- Technically qualified lowest evaluated tender awarded contract
- Six (6) GIS substations awarded to ABB
- Back-to-Back HVDC station awarded to AREVA - Cogelex
- Two overhead transmission lines awarded to NCC
- Two overhead transmission lines awarded to HEC – MEEDCO
- Submarine & Land cable awarded to Prysmian/Nexans
- Control Centre, Protection & Telecommunications awarded to AREVA - Cogelex

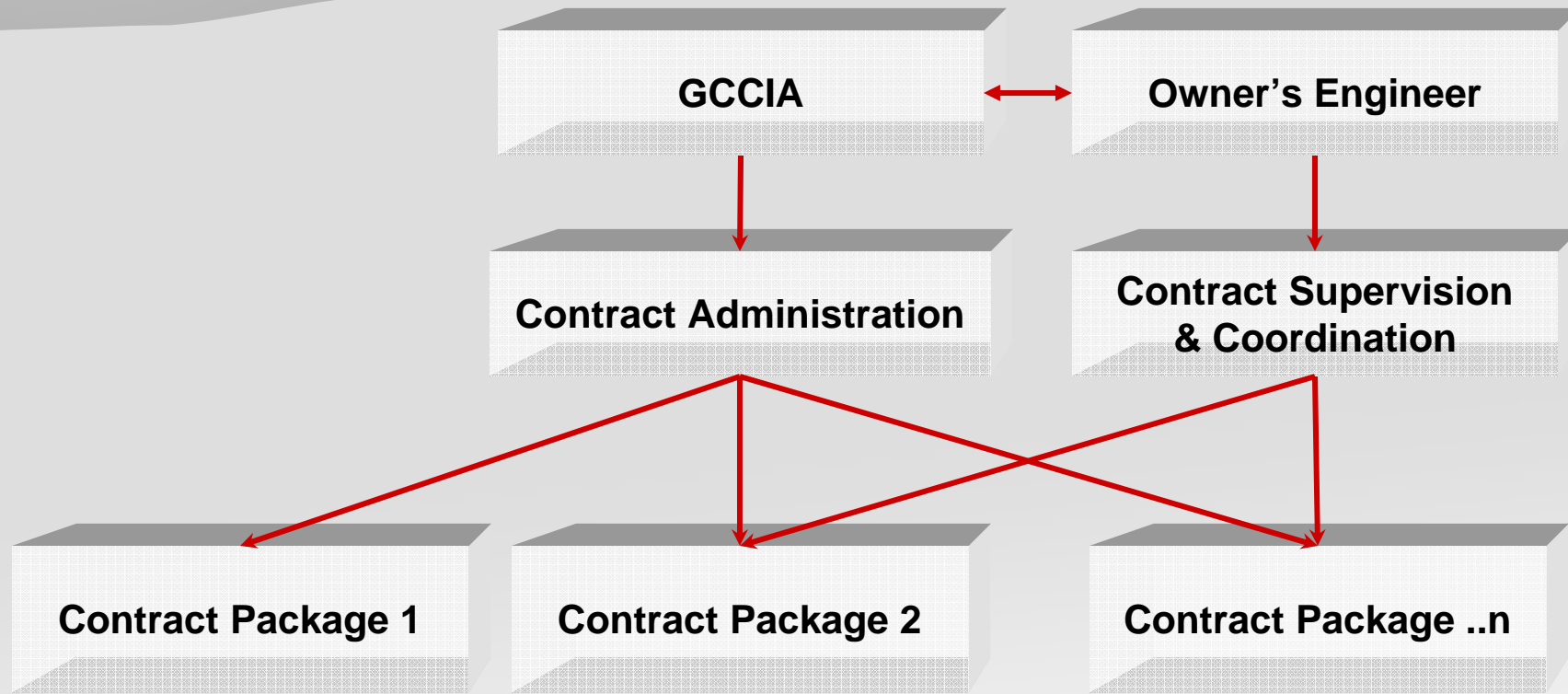


# Phase I Implementation Strategy

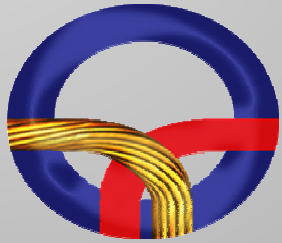
- For implementation purposes the project was broken down into 13 discrete EPC contract packages.
  - Six contract packages for the GIS substations
  - One contract for the back-back HVDC station
  - Four contracts for the transmission lines
  - One contract for the land & submarine cable
  - One contract for the control center (including telecommunications, control & protection)
- The contractors will work concurrently but independently from one another.
- The strategy enabled wide participation by international contractors in the shared implementation of the project.



# Implementation Strategy – Functional Relationship

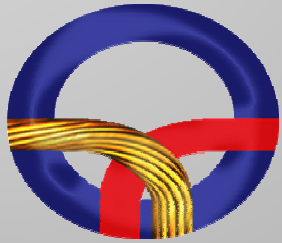


Functional Relationships



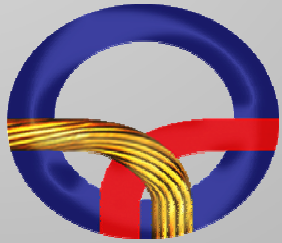
# Project Management – Complexity

- 13 different EPC contract packages with facilities in four countries : Kuwait, Saudi Arabia, Bahrain and Qatar
- Client, GCCIA, in Dammam, Saudi Arabia
- Engineer, SNC Lavalin, based in Montreal with resident team in Dammam
- EPC Contractors design teams located in several countries plus different site offices and sourcing of equipment from around the world
- Information flow and design approvals is a major issue between different design and site offices



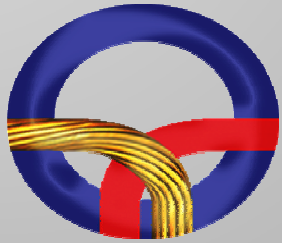
# Fundamentals of Project Management

- Based on 'Goal Setting' the project is a strategy that will meet this goal.
- Project is defined in terms of constraints: Time, Budget and Performance.
- To successfully meet these constraints a project must be well managed.
- Project Management requires:
  - Set a clear project goal
  - Determine project objectives
  - Establish checkpoints (milestones, activities, and time estimates)
  - Draw a picture of the project (MS Project)
  - Keep everyone connected with the project informed and reinforce commitment and excitement.



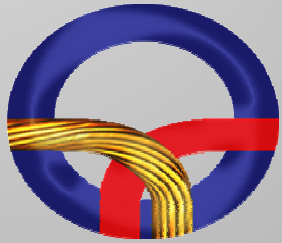
# Fundamentals of Project Management

- PM is a complex task as it involves the following critical duties:
  - Ensure the contract limits and interfaces are well specified
  - Ensure that the documentation of the contractors are consistent and cross referenced
  - Supervise the individual contract schedules to assure meeting the overall project schedule
  - Facilitate the coordination between the individual contractors and the GCC member utilities
  - Establish the overall control philosophy for the joint operation of the interconnected network
  - Supervise the testing and commissioning of the individual substations as well as the interconnected systems
  - Prepare weekly, monthly and quarterly progress reports



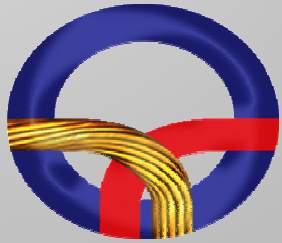
# Project Management – MIS

- To ensure proper information flow three easy and effective management information systems have been implemented to share, control and store information for GCCIA, the Contractors and other entities:
  - Exchange Public Folder – Microsoft Outlook
    - A Project E-mail address has been assigned to ensure a single and effective channel of communication and to share this information with multiple users (Engineer's employees) in Dammam and Montreal
  - Electronic Document Management System – Microsoft SharePoint
    - Is an internet based tool used to store in a specific website and share with multiple users all kinds and large amount of documents, tasks, contacts, events and announcements without sending hardcopies via mail or courier.



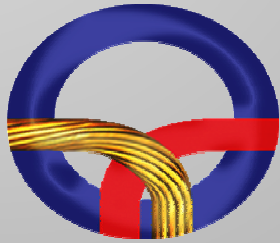
# Project Management – MIS

- Project Management (PM+) Document Control Module  
PM+ is a SNC Lavalin developed program tailored to track a project at all levels and to better plan and control scope, budget, schedule, documents and quality.
  - For this Project the document control module is used by the Engineer. The module generates date stamps to mark-up the status of document revisions and generates transmittal sheets to expedite documents internally and externally.



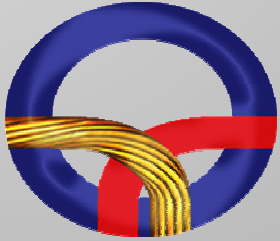
# Progress of Implementation

- Design review of the GIS substations is well advanced and issues such as interfacing with existing substations and fitting into available space were addressed
- Work is progressing on the detailed design studies for the HVDC converters
- Design review is well advanced for the Transmission lines. Because of the environmental pollution it was decided to coat the insulators with silicone. The concrete mix for the foundations had to take into account the high salt content in the soil.
- A detailed survey of the submarine and land cable routes has been completed.
- Design review is underway for the Control Centre and the protection and telecommunication system



# Project Schedule

Update Technical and Economic Feasibility	2003 / 2004
Approval of Project Financing	May 2004
Issue of Tender Documents	February 2005
Tenders Received	June 2005
Tenders Evaluated and Recommendation for Award	September 2005
Contracts Awarded	November 2005
Project Operation	Early 2009



# Conclusions

- Project under-study since mid-eighties
- Agreement and participation required by six GCC countries
- Principal Issues that had to be resolved
  - **Demonstration of feasibility**
  - **Agreement between countries**
  - **Creation of the GCC Interconnection Authority**
  - **Agreement on cost sharing and financing**
- Project is now under implementation
- Implementation strategy adopted was to divide the Project into Contract Packages and to go out for International Competitive Bidding
- Management of the Project is a complex task and it was decided to use an Electronic Data Management System to share, control and store large amounts of information in a secure manner
- Overall Project progress is around 20 % and it is targeted to be completed on schedule