RFID for Access Control in Construction Sites

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Consolidated Contractors Company

www.ccc.gr
Outline

• Problem Statement
• Business Objectives
• Project Approach
• Alternative Solutions
• Technology Selection
• Implementation
• Results
• Risks
• ROI/Savings
• Summary
Consolidated Contractors Co.

- Founded in 1952 and based in Athens, Greece
- Record revenues of US$ 5 billion/Yr for the past five years
- CCC is predominately a construction company, providing project management, engineering, procurement & construction services for: oil & gas, petrochemical, pipelines, building, heavy civil, marine, and maintenance works
- Traditionally focused in the Middle East, CCC now has projects and activities worldwide, crossing Africa, Caribbean and now Papua New Guinea and Australia
- Diversified workforce of 100,000 qualified men and women embodying over 90 different nationalities
- Ranked consistently for the last 10 years in the top 20 International Contractors
With the increase of the size of construction projects, the number of employees per site has increased accordingly. Employees line up in queues to enter site premises, manually checking each one’s ID on the badge against a list provided from the HR department. As an assumption, if security takes around 10 seconds to verify an employee’s ID, then it would take around 1.5 hours for 500 employees entering and exiting on a daily basis. What about an average project of 5,000 employees in and out daily?

Daily reports have to be submitted to client on a daily basis listing manpower on site. HSE requires similar information for emergency cases.

Problem Statement
Business objectives

• Decrease the time consumed at gates
• Have live update of the current manpower on site, per location
• Provide personnel department with another tool to validate attendance by comparing access control system data with Timesheet data.
Project Approach

• Select a suitable construction project
• Sell the idea of RFID to project manager
  – Cost
  – R&D (Time and Risk)
• Start with the RFID pilot on a small group
  – Monthly staff (500 employees) vs. Daily staff (4,000 employees)
• Have a backup plan(s)
Proposed Solutions

• PROXIMITY
• Portable Barcode Readers (Handhelds)
• RFID
  – Portable Readers (Handhelds)
  – Fixed Readers
    • Gate Setup
    • Bus Setup
PROXIMITY
PROXIMITY - Methodology

1. Permits employees satisfying the shift period! (if there are several shifts during the day) Ex. Some attend at 5:00 and others at 6:00 according to a schedule set by personnel.

2. Checks if this employee is allowed to enter the facility or not? A specific beep sounds and a LED on denial!

3. Counts total number of employees entering the facility, each reader counts independently!
PROXIMITY

PROS
- Contactless
- Effectiveness
- Reliable
- Peace of Mind!

CONS
- Many readers needed to avoid choke points
- Very short reading distance
- Infrastructure i.e. Power Source & Network to operate
- Costly compared to other technologies
PROXIMITY

• LIVE!
Portable Barcode Readers (Handhelds)
Portable Barcode Readers

• Methodology
Portable Barcode Readers (Handhelds)

PROS

- Mobility!
- Efficiency
- No Infrastructure
- Visibility of Information and data access on spot

CONS

- Requires proper straight line-of-sight
- Short Reading Distance
- Consumes 2-4 seconds for each successful scan
- Timekeepers or Security guards needed to do scanning!
- Number of handhelds is limited to the number of end-users (Timekeepers/Security Guards)
Portable Barcode Readers

• LIVE!
RFID – Portable Readers (Handhelds)
RFID – Portable Readers (Handhelds)

**PROS**

- Mobility!
- Faster in read capturing compared to scanning
- Longer read distance compared to Barcode & PROXIMITY readers
- Can read more than one card/tag at a time
- No Infrastructure
- Visibility of Information and data access on the spot

**CONS**

- Timekeepers or Security guards needed to collect reads!
- Number of handhelds is limited to the number of end-users (Timekeepers/Security Guards)
RFID – Fixed Readers (Gate Setup)
RFID – Fixed Readers (Gate Setup)

• Proposed Solution Methodology
  – A fixed reader to be installed on each gate. Antennas adjusted at various heights until the most effective and appropriate coverage that simultaneously fetches all the on-board tags.
  – Tags are in Credit Card shape with information and photo printed on card. Card will be tied to card holder in a Neck Tie form. or key fob tags will be used.
  – All antennas are connected to a controller unit aka Fixed RFID reader, that will handle the read process and syncing with a back-end database using GPRS.
  – A LED display or counter that assists visually the guards by representing a counter for the tags fetched at entry, in which in fact could add easiness to their validation.
RFID – Fixed Readers (Gate Setup)

• Methodology

1. Permits employees satisfying the shift period. (If there are several shifts during the day) Ex. Some attend at 5:00 and others at 6:00 according to a schedule set by personnel

2. Checks if this employee is allowed to enter this facility or not? Employees will be walking through the gate or by cars and buses

3. Counts total number of employees entering the facility, each reader counts independently!
RFID – Fixed Readers (Gate Setup)

• Technology Advantages (PROS):
  – Long read range (Up to 100 Meters)
  – Can read more than one card/tag at a time
  – No need for timekeepers or end-users
  – Attendance data & reports immediately available and up-to-date
Pre Implementation

Project Specifications:

Location: One of CCC’s Construction projects at Habshan Area – 150 KM away from Abu Dhabi ~ 300 KM from Dubai

Environment: Harsh desert with high level of humidity and temperatures. What you call it a ‘sand storm’ is actually living there!

Number of Gates: 6 gates; 3 @ site + 3 @ camp

Gate Width: ~ 40ft

Gate Functionality: In/Out

Employees: 500 monthly staff

Time frame: 2 months from inception to completion

Implementation Target: Control the Attendance of the monthly staff working at the project and report the In/Out transactions with no interaction of users. Taking into consideration the allocated budget and time constraint to deliver.
# Technology Selection

**Excluded Technologies:**
- Fixed Proximity Readers
- Portable Barcode Readers
- Portable RFID Readers

**Technology Options:**
- **RFID – Passive**
- RFID – Battery Assisted
- RFID – Active

**RFID Passive:**
- EPC compatibility
- Lowest tag price
- Tag is much smaller and available in credit card form
- The tag functions without a battery
- Standard and approved protocol and frequency by the regulatory authority. No need for type approval.
### Pilot Implementation

**Pilot #1.1**

**Passive**

<table>
<thead>
<tr>
<th>Design:</th>
<th>1 passive reader with built-in linear antenna was fixed 6 feet above ground and facing inwards to the site (out) and angled slightly downwards.</th>
</tr>
</thead>
</table>
| Method: | 3 people walking together with tags hanging around neck  
Tags 1, 2, 3 (*not in plastic sleeve*) – *All tags are passive*  
Walk through the middle of the Gate |
| Result: | 2 Tags (2&3) were read  
1 Tag (1) was not read |
| Recommendations & Thoughts: | Change the height of the reader, tilt the reader and change the angle  
Add another reader with extra antennas to the gate on different height & angle |
Pilot Implementation

Pilot #1.2 Passive

Design:
- 1 passive reader ‘A’ with built-in linear antenna was fixed on 7.5 feet from ground and facing outwards from the site (In) and angled slightly downwards.
- 1 passive reader ‘B’ with built-in linear antenna was fixed on just under 6 feet from ground and facing inwards to the site (out) and angled slightly downwards.

Note: The readers are not directly facing each other.

Method:
- 3 people walking together with tags hanging around neck
- Tags 1, 2, 3 (not in plastic sleeve) – All tags are passive

Result:
- 1 Tag (2) was read
- 2 Tags (1&3) were not read

Recommendations & Thoughts:
- Start testing on vehicles with employees onboard
## Pilot Implementation

### Pilot #1.3 Passive

<table>
<thead>
<tr>
<th>Design:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 passive reader ‘A’ with built-in linear antenna was fixed on 7.5 feet from ground and facing outwards from the site (In) and angled slightly downwards.</td>
</tr>
<tr>
<td>1 passive reader ‘B’ with built-in linear antenna was fixed on just under 6 feet from ground and facing inwards to the site (out) and angled slightly downwards.</td>
</tr>
<tr>
<td>Note: The readers are not directly facing each other.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 vehicle ‘Sedan’ having 1 tag on the dashboard with 2 people + driver on board with tags hanging around neck</td>
</tr>
<tr>
<td>3 additional tags placed and distributed on the back seat of the vehicle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only the vehicle tag ‘on dashboard’ was consistently read in all 10 trials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendations &amp; Thoughts:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze the Impact of adding extra antennas ‘Circular’ to the gate (Technical &amp; Cost)</td>
</tr>
<tr>
<td>Rethink on using different RFID Technology</td>
</tr>
</tbody>
</table>
Results

• Passive Technology:
  – Passive technology failed to satisfy the access control requirements for this project
  – Passive tag’s transmitted signal is severely blocked/absorbed by human body
  – Passive technology would work for vehicles access control ~ *If speed is controlled using speed humps at gate to reduce the speed as much as possible or by enforcing the vehicle to stop for 2-4 seconds. Moreover, a LED to alert the driver that his vehicle is already read.*
  – Passive Tag read range is limited to 3 meters
## Technology Selection

### Excluded Technologies:
- Fixed Proximity Readers
- Portable Barcode Readers
- Portable RFID Readers

### Technology Options:
- RFID – Passive
- RFID – Battery Assisted
- RFID – Active

### RFID Battery Assisted:
- EPC compatibility
- Lower tag price compared to Active tags
- Tag is small and available in credit card form
- Standard and approved protocol and frequency by the regulatory authority. No need for type approval.
- Work with UHF Passive readers (Same Infrastructure)
- Longer read range compared to passive tags
Pilot Implementation

Pilot #2.1

Battery Assisted Passive

Design:
- 1 passive reader ‘A’ with built-in linear antenna was fixed on 7.5 feet from ground and facing outwards from the site (In) and angled slightly downwards.
- 1 passive reader ‘B’ with built-in linear antenna was fixed on just under 6 feet from ground and facing inwards to the site (out) and angled slightly downwards.

Note: The readers are not directly facing each other.

Method:
- 3 people walking together with tags hanging around neck
- Tags 1, 2, 3 (not in plastic sleeve) – All tags are BAP

Result: All Tags were successfully read (A tag read by at least one reader)

Recommendations & Thoughts:
- Start testing on vehicles with employees onboard
## Pilot Implementation

### Pilot #2.2

**Battery Assisted Passive**

<table>
<thead>
<tr>
<th>Design:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 1 passive reader ‘A’ with built-in linear antenna was fixed on 7.5 feet from ground and facing outwards from the site (In) and angled slightly downwards.</td>
</tr>
<tr>
<td>- 1 passive reader ‘B’ with built-in linear antenna was fixed on just under 6 feet from ground and facing inwards to the site (out) and angled slightly downwards.</td>
</tr>
</tbody>
</table>

*Note:* The readers are not directly facing each other.

<table>
<thead>
<tr>
<th>Method:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 1 vehicle ‘Sedan’ having 1 tag on the dashboard with 2 people + driver on board with BAP tags hanging around neck</td>
</tr>
<tr>
<td>- 3 additional BAP tags placed and distributed on the back seat of the vehicle</td>
</tr>
<tr>
<td>- 25 trials made to assure accuracy in results ~ Test report available for reference</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never all the tags got read. And no consistency in the tags being read.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendations &amp; Thoughts:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Use circular antennas</td>
</tr>
</tbody>
</table>
Pilot Implementation

Pilot #2.3 Battery Assisted Passive

Design:
- 1 passive reader ‘A’ with built-in circular antenna was fixed on 7.5 feet from ground and facing outwards from the site (In) and angled slightly downwards.
- 1 passive reader ‘B’ with built-in circular antenna was fixed on just under 6 feet from ground and facing inwards to the site (out) and angled slightly downwards.

Note: The readers are not directly facing each other.

Method:
- 1 vehicle ‘Sedan’ having 1 tag on the dashboard with 2 people + driver on board with BAP tags hanging around neck
- 3 additional BAP tags placed and distributed on the back seat of the vehicle
- 10 trials made to assure accuracy in results ~ Test report available for reference

Result: Never all the tags got read. And no consistency in the tags being read.

Recommendations & Thoughts:
- Enforcing the vehicles to stop at gate for 2-4 seconds
Pilot Implementation

Pilot #2.4 Battery Assisted Passive

Design:
- 1 passive reader ‘A’ with built-in circular antenna was fixed on 7.5 feet from ground and facing outwards from the site (In) and angled slightly downwards.
- 1 passive reader ‘B’ with built-in circular antenna was fixed on just under 6 feet from ground and facing inwards to the site (out) and angled slightly downwards.

Note: The readers are not directly facing each other.

Method:
- 1 vehicle ‘Sedan’ having 1 tag on the dashboard with 2 people + driver on board with BAP tags hanging around neck
- 3 additional BAP tags placed and distributed on the back seat of the vehicle
- Vehicle had to reduce speed because of speed humps and almost stopped on the gate next to reader for 2-4 seconds
- 10 trials made to assure accuracy in results ~ Test report available for reference

Result: Many tags were read in every trial but not all. The more people in vehicle the less reads captured. Also No consistency in the tags being read.
Results

• BAP Technology:
  – BAP technology failed to satisfy the access control requirements for this project
  – BAP tags had shown better read rate compared to passive tags
  – BAP technology would work for this project if one linear antenna & one circular antenna is added to each side of the gate. And by controlling the speed of vehicles at gate by adding humps. However, the cost of this setup for 6 gates is very similar to the cost of Active RFID solution
Technology Selection

Excluded Technologies:
- Fixed Proximity Readers
- Portable Barcode Readers
- Portable RFID Readers

Technology Options:
- RFID – Passive
- RFID – Battery Assisted
- RFID – Active

RFID Active:
- Highest tag price compared to passive & BAP
- Tag is bigger and not available in credit card form from the solution provider
- The longest read range compared to passive tags & BAP
- Needs approval from the regulatory authority for each tag protocol and frequency.
## Pilot Implementation

### Pilot #3.1

**Active**

#### Design:
- 1 active reader fixed at the gate. No antennas.

#### Method:
- 5 people walking together each one holding 2 tags hanging around the neck
- Tags 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 – All tags are Active ~ *Test report available for reference*

#### Result:
All tags were consistently being read.
Tags were being read from a very long distance before reaching the gate; sometimes while still in the offices away from the gate.
Tags were being read many times causing over reporting and misleading information.

#### Recommendations & Thoughts:
- Start testing on vehicles with employees onboard
Pilot Implementation

Pilot #3.2
Active

Design:
- 1 active reader fixed at the gate. No antennas.

Method:
- 1 vehicle ‘Sedan’ having 1 tag on the dashboard with 2 people + driver on board with active tags in their pockets
- 5 additional tags placed and distributed on the back seat of the vehicle

Result:
All tags were consistently being read.
Tags were being read from a very long distance before reaching the gate
Tags were being read many times causing over reporting and misleading information

Recommendations & Thoughts:
- Start testing on buses with employees on board
- Reduce the read range from 100M to 15M
- Redesign the business logic of the software to cater the in/out functional requirement
## Pilot Implementation

<table>
<thead>
<tr>
<th>Pilot #3.3</th>
<th>Active</th>
</tr>
</thead>
</table>

### Design:
- 1 active reader fixed at the gate. No antennas.

### Method:
- A “Coaster” bus having 1 tag on the dashboard with 9 people + driver on board with active tags in their pockets

### Result:
At least 9 tags were consistently being read.
- Tags were being read from a very long distance before reaching the gate
- Tags were being read many times causing over reporting and misleading information

### Recommendations & Thoughts:
- Start testing on buses with employees on board
- Reduce the read range from 100M to 15M
- Redesign the business logic of the software to cater the in/out functional requirement
- Install speed humps at each gate to reduce the speed of vehicles
Summary

• Active Technology
  – The Active RFID technology seems to work for this specific project.
  – Promising “Proof of Concept”
  – Reading is 90% addressed with active solution. However, still to be enhanced!
  – The software should resolve the issue of having too many readings for the same tag in few seconds
  – The software logic should be restructured to fix the In/Out function anomaly
Final Implementation

• Two solar powered active readers will be installed at each gate to control the ‘In’ & ‘Out’ of employees (total of 6 gates)
• All devices are having electrical power source as backup plan
• 500 Key Fob Active tags were distributed to all employees
• Software is redesigned by solution provider to implement a new business logic catering the requirements of attendance control and assure having accurate Entry/Exit transactions
• Each device coverage will be limited to 60ft radius with 10ft buffer zone between both devices coverage areas. Overall distance between both devices will be 130ft
• A speed hump, before and after each device, is mandatory to overcome the 8 seconds tag’s transmitting frequency
The following diagrams show the RFID reader set-up of each gate at CCC’s Abu Dhabi site project. Readers will be represented by the following small yellow boxes.

**CAMP IN/CAMP OUT GATE**
These gates are connected; vehicles can only come IN on CAMP IN, or OUT on CAMP OUT.

**All other Gates**
Vehicles can only come IN and OUT of all each of the other gates. For example, a vehicle cannot come into the PMV gate and exit through the MAIN gate. They must enter and exit through the PMV gate. This rule applies to all 3 remaining gates.
Each device coverage will be limited to 60ft radius with 10ft buffer zone between both devices coverage areas. Overall distance between both devices will be 130ft.
RFID – Fixed Readers

Green!
Final Implementation – Live!
Final Implementation – Live!
Final Implementation – Live!
Sample Reports

## Employee Attendance

<table>
<thead>
<tr>
<th>Num.</th>
<th>Employee Name</th>
<th>Badge No</th>
<th>Job Title</th>
<th>Tag ID</th>
<th>In (Earliest Time In)</th>
<th>Out (Latest Time Out)</th>
<th>Status</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ABDUL KHAIR K. ABDUL RASHID</td>
<td>D090296</td>
<td>QC INSPECTOR</td>
<td></td>
<td>Mon 11-Apr-2011 07:06:26 AM (GI Office Gate)</td>
<td>Mon 11-Apr-2011 06:20:24 PM (GI Office Gate)</td>
<td>Present</td>
<td>Show Details</td>
</tr>
<tr>
<td>2</td>
<td>ABDULLA K. PUTHIYYA YEETIL</td>
<td>D090200</td>
<td>CHARGEHAND - RIDGING</td>
<td>D000350</td>
<td>Mon 11-Apr-2011 06:09:46 AM (GI Office Gate)</td>
<td>Mon 11-Apr-2011 06:00:32 AM (GI Office Gate)</td>
<td>Present</td>
<td>Show Details</td>
</tr>
<tr>
<td>3</td>
<td>ABBO MOHAMED I. AL NAZI</td>
<td>D08777</td>
<td>CHARGEHAND - STIRR, PDI</td>
<td>D000380</td>
<td>Mon 11-Apr-2011 08:38:32 AM (GI Office Gate)</td>
<td>Mon 11-Apr-2011 08:38:54 AM (GI Office Gate)</td>
<td>Present</td>
<td>Show Details</td>
</tr>
<tr>
<td>4</td>
<td>ADEL MOHAMMED A. AL QADOURI</td>
<td>D08170</td>
<td>SITE SUPERVISOR - WELDING</td>
<td>D000387</td>
<td>Mon 11-Apr-2011 08:39:16 AM (GI Office Gate)</td>
<td>--</td>
<td>Present</td>
<td>Show Details</td>
</tr>
<tr>
<td>5</td>
<td>AHMED MOHAMAD THAIEMI</td>
<td>D08200</td>
<td>JR ADMINISTRATOR - HR</td>
<td>D000260</td>
<td>Mon 11-Apr-2011 06:38:55 AM (GI Office Gate)</td>
<td>Mon 11-Apr-2011 05:47:24 PM (GI Office Gate)</td>
<td>Present</td>
<td>Show Details</td>
</tr>
<tr>
<td>6</td>
<td>AHMED FAWAZ SAULI ABU ZEHRI</td>
<td>D08265</td>
<td>JR ENGINEER - PLANNING</td>
<td>D000211</td>
<td>Mon 11-Apr-2011 10:03:28 AM (GI Office Gate)</td>
<td>Mon 11-Apr-2011 09:39:49 AM (GI Office Gate)</td>
<td>Present</td>
<td>Show Details</td>
</tr>
</tbody>
</table>

Total Duration: 9h 48m 58s
<table>
<thead>
<tr>
<th>Employee Name</th>
<th>Emp.Badge No</th>
<th>Job Title</th>
<th>Emp.Tag ID</th>
<th>Last Updated</th>
<th>Device ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>BARRIE DENNIS</td>
<td>66435</td>
<td>MANAGER - HSE</td>
<td>D000336</td>
<td>Sat 19-Mar-2011 05:57:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>ELIE EID NASSAR</td>
<td>68283</td>
<td>ENGINEER - E &amp; I</td>
<td>D000365</td>
<td>Sat 19-Mar-2011 06:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>ANTHONY REMEDIO MENDES</td>
<td>68443</td>
<td>SITE GENERAL FOREMAN - WELDING</td>
<td>D000291</td>
<td>Sat 19-Mar-2011 06:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>GYANENDRA KUMAR SHRESTHA</td>
<td>68453</td>
<td>CLERK</td>
<td>D000392</td>
<td>Sat 19-Mar-2011 07:01:02 AM</td>
<td>AD011</td>
</tr>
<tr>
<td>HOSAM YOUSEF MAHMOUD NASER</td>
<td>68528</td>
<td>HSE OFFICER</td>
<td>D000402</td>
<td>Sat 19-Mar-2011 07:01:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>PRASHU RALAXMAN LAMICH HANE</td>
<td>68454</td>
<td>CLERK</td>
<td>D000552</td>
<td>Sat 19-Mar-2011 07:01:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>AHMED A. ALADDI</td>
<td>60542</td>
<td>SECURITY OFFICER</td>
<td>D000310</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD011</td>
</tr>
<tr>
<td>SALMAN HASIB AL ASHKAR</td>
<td>68011</td>
<td>DRAFTSMAN</td>
<td>D000364</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>SHANKAR DODLA</td>
<td>68656</td>
<td>QC ENGINEER</td>
<td>D000117</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>ELIAS SOUSA CAMILO ROSARIO ROSARIO</td>
<td>68786</td>
<td>DATA ENTRY OPERATOR</td>
<td>D000364</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>CARLITO BEJOC ESTENZO</td>
<td>68566</td>
<td>QC INSPECTOR</td>
<td>D000349</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>JOHNSON CHIRAYATH MANJIVL DEvassh</td>
<td>66501</td>
<td>CLERK</td>
<td>D000431</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>MANUEL ESPIRITU AUDAUNA</td>
<td>65065</td>
<td>DRAFTSMAN</td>
<td>D000472</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>MAZEN MAHMOUD DIMASSI</td>
<td>68462</td>
<td>CLERK</td>
<td>D000477</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>MOHAMMAD MAMDOUH YOUNES</td>
<td>68564</td>
<td>SR HR SPECIALIST - TRAINING &amp; DEVELOPMENT</td>
<td>D000500</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD0096</td>
</tr>
<tr>
<td>NORMAN GLODOVEZA ATIENZA</td>
<td>68031</td>
<td>CLERK</td>
<td>D000539</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD011</td>
</tr>
<tr>
<td>SALAH MOHAMED MOGHAZY</td>
<td>68028</td>
<td>MATERIAL CONTROLLER</td>
<td>D000094</td>
<td>Sat 19-Mar-2011 07:30:02 AM</td>
<td>AD011</td>
</tr>
<tr>
<td>SLIM HANNACHI</td>
<td>67370</td>
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Risks

• The cost of Active Solution is high compared to all other solutions
• Rules and regulations of active tags frequencies in different countries
• On going cost of Active Tag’s Battery (Life time = 1 year only)
• Design of Active tags in Key Fob form and allow replacing the battery
• Accuracy in readings and the 8 seconds tag’s transmission frequency
• Short Time-Frame from inception to completion (2 months only)
• Solutions availability in local markets
• Solution provider is oversees and unfamiliar with the Middle-East environment. Also solution provider’s local partner is new to this product.
• Delays in shipments, delivery, and customs (multiple locations)
• Delay in support because of time difference between US & Middle East
• Remote location of the project ~ 300KM from Dubai
• Ad-hoc requests and needs (solar powered readers, Power convertors)
• Environmental conditions : Dusts, humidity, temperature, etc.
• Etc…
ROI (Savings)

• Better Control → More productive hours
  – Saving on a faster gate in and out processes
    If we eliminate 5 minutes delay at gate for each employee waiting in line, we end up saving around $6,500/month*
  – Controlling arrival and departure time of employees
    If we save 15 minutes by controlling the starting and ending working hours of each employee, we end up saving around $19,500/month*

* 500 employees, average cost $6/hour, 26 working days per month
What is Next?

- Re-evaluate passive and BAP tags
- Daily employees: Fixed Readers with passive RFID tags (Bus Setup)
  - A fixed Passive reader will be installed on-board in each bus exactly above the door step.
  - Reader will capture all the tags boarding on bus
  - Passive tags on helmets.
Q&A
Thank You