Introduction to Cell Site Life Cycle Management (CSLM)

In 2008, China’s telecom market went under reconstruction. China Mobile, China Unicom and China Telecom all obtained a full-operation license. The market has since been more competitive than ever. In addition to offering quality service for their customers, telecom providers need to lower expenditure on operation and cell sites. Nevertheless, the one which follows the strategy “broaden income sources and reduce expenditure” is likely to emerge as the winner.

CSLM software provides centralized management of cell sites, valuable assets information such as the sites’ full operating cycle. It avoids the waste of resources due to improper management and improves the quality of services based on accurate information.

CSLM is a software package which manages the major lifecycle activities of telecom cell sites from Annual Planning, Search Ring, Acquisition, Subcontracting, and then Construction, Project Management, Work order Dispatching, Budget Control, Progress Monitoring, and Acceptance Testing till On Air Operations and Maintenance according to operator’s SOP. CSLM also includes flexible workflow to accommodate operators’ Re-organization, Merging, Re-engineering, and also Site Relocation, Dismantling, etc.

CSLM is able to help Operator centralized control cell sites valuable assets information to resolve the following management challenges:
1. Data loss caused by staff alteration
2. Data duplication and reworking
3. Data inconsistence
4. Frequent re-organization and facilities alteration
5. Vaguely controlled engineering project status and its execution cost
6. Poorly managed material and work orders
7. Engineering data hardly integrated with other enterprise information systems

CSLM provides operators and contractors to enter data once and access many times via automatic interfaces to link different application systems, such as ERP, e-Procurement, and Contractor Management systems. CSLM avoids multiple data entry errors and assure data consistency.

Features of the CSLM:

- **Automation** - Assignments can be automated accomplished on time by CSLM auditing function.
- **Accuracy** - Data can be accurately integrated by CSLM approving and workflow injection.
- **Efficiency** - Working efficiency can be improved by reducing print out hardcopies, shorten document delivery time, and avoid data duplication.
- **Reporting & Analysis** - Statistic reports can be generated easily by analyzing integrated data.
- **Standardization** - Operation quality can be assured by implementing CSLM SOP.
- **Synchronized Data** - Everyone in the enterprise can access synchronized data across heterogeneous systems.
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CSLM block diagram and the relationship with other systems:

BSS (Business Support System)

<table>
<thead>
<tr>
<th>Customer/Service</th>
<th>Billing</th>
<th>Info. Security</th>
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<tbody>
<tr>
<td>Backup</td>
<td>CRM</td>
<td>ERP</td>
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</table>

CSLM

<table>
<thead>
<tr>
<th>Operation &amp; Maintenance</th>
<th>Logistics Support</th>
<th>Dismantle Mgt.</th>
</tr>
</thead>
</table>

OSS (Operation Support System)

<table>
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<tr>
<th>CSN</th>
<th>Firewall</th>
<th>AAA</th>
<th>DHCP</th>
<th>MIP HA</th>
<th>DNS</th>
<th>LR</th>
<th>NMS</th>
</tr>
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Cell Station

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<tr>
<th>2G</th>
<th>3G</th>
<th>HSxPA</th>
<th>Wimax</th>
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Cell Station

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Public IP Network

Enterprise VPN

PSTN

CSLM includes two major systems which can be deployed separately:

I. Engineering Construction System
   1. Planning Management
   2. Construction Management
   3. Cost Management

II. Operation and Maintenance System
   1. Operation and Maintenance Management
   2. Logistics Support
   3. Dismantle Management

OmniWise has successfully applied CSLM to FET, Taiwan Mobile, Vibo Telecom, and KGEx in Taiwan.
CSLM Software Architecture and Technical Description

CSLM is developed by state-of-art technology based on Java J2EE SOA architecture with third party’s workflow engine. It is easy to use to overcome the existing management difficulties. It includes two major systems that can be used separately.

I. Engineering Construction System
   1. Planning Management
   2. Construction Management
   3. Cost Management

II. Operation and Maintenance System
   1. Maintenance Management
   2. Logistics Support
   3. Dismantle Management

The strengths of using SOA architecture:

1. easy to be integrated as a total solution by modulized design,
2. easy to perform functional enhancement
3. easy to expand by using off-the-shelf standard components

CSLM Software Architecture

![Diagram of CSLM Software Architecture]

- Browser
- Mobile
- Mail
- Intranet

http://

Java AP Infrastructure

<table>
<thead>
<tr>
<th>OWLET SOA Framework (Java)</th>
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<tbody>
<tr>
<td>Java AP Infrastructure</td>
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<tr>
<td>Web Service</td>
</tr>
<tr>
<td>Message Queue</td>
</tr>
<tr>
<td>AP Server WebLogic9</td>
</tr>
<tr>
<td>Search Engine Power Process 4</td>
</tr>
<tr>
<td>Report Server Crystal Clear 7</td>
</tr>
<tr>
<td>DB Server Oracle 10g</td>
</tr>
</tbody>
</table>

Browser

Mobile

Mail

Intranet

OWLET SOA Framework (Java)
CSLM Software Architecture:

1. **Single sign-on:**
   CSLM integrates existing portals and is authenticated by Active Directory to provide users accessing multiple information and different application systems via single entry.

2. **Active Directory:**
   CSLM provides LDAP standard mechanism to manage security and reliability of personal identification and object relationship; CSLM also provides system and user common Active Directory in Internet by using hierarchical and distributed databases.

3. **Workflow Management:**
   CSLM separates tables and workflow; dynamically creates approval checkpoints; supports approval procedures in sequence or in parallel; correctly sends application forms to the responsible person according to operators SOP by using dynamic workflow engine.

4. **Report Service:**
   CSLM unifies report service and manages digital data by using off-the-shelf report tools.

5. **Common System:**
   CSLM provides integrated service mechanism and modules to link and communicate data among application systems. The module includes interface, error handling, auditing, authorization, authentication, registration, code conversion modules, etc.

6. **Application System:**
   CSLM provides application services, including Engineering and Planning Management, Construction Management, Cost Management of the Construction System; Management, Logistics Support, Dismantle Management of the Operation and Maintenance System.

7. **Audit Log:**
   CSLM provides the audit mechanism to manage the operating status of elements and application systems.

8. **Synchronous/Asynchronous Management:**
   CSLM changes or exchanges data synchronously or asynchronously through Message Queue.
Brief Description of the CSLM Application System:

I. Engineering Construction System:

1. Planning Management
   (1) Annual Plan Management Module: includes Annual Cell Site Construction Plan, Version Control, and Budget data management.
   (3) Site Acquisition Management Module: includes Search Ring Management, Version Control, approval procedures, Site ID/BTS ID Management, and Candidate Site Management.

2. Construction Management
   (1) Configuration and Version Control Module: includes Indoor/Outdoor Coverage Cell Site Configuration Settings and maintenance, and also the Version Control.
   (2) Scheduling Management and Auditing Module: provides applicable engineering schedule templates for different cell site equipments, assigns expected finish date of cell site construction items according to start date, and claims delivery notice for unfinished items.
   (3) Construction Work Order and Dispatching Module: includes Vendor Acquisition, Dispatching, and Acceptance Testing of the Work Order.

3. Construction Suspension/Resumption Module: provides the approval procedures of Construction Suspension/Resumption and Construction Failure Notification.


II. Operation and Maintenance System:

1. Maintenance Management
   (1) Preventive Maintenance Module: includes Cell Site Preventive
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1. Maintenance Schedule, Items, Notification, Records, and Dispatching, etc.

2. Engineering Changing Management Module: includes the application of System and Engineering Changes and the notification of approval procedures, Message and E-Mail, etc.

3. Rework Order Module: includes the Initiation, Dispatching and Acceptance Testing of the Cell Site Rework Order.


5. Transmission Work Order Module: includes the Initiation, Dispatching and Acceptance Testing of Microwave Construction Work Order and the Cable Deployment/Dismantle Work Order.

6. Transmission Route Management Module: includes Cell Site Transmission Routing management, route Settings and Search, etc.

2. Logistics Support

1. Cell Site Permit/License Management Module: includes Cell Site Permit/ License application, registration, approval, rejection, suspending, changing, and cancelation.

2. Cell Site Protest Management Module: includes the records of Protest Initiation and Handling, Official Document Maintenance and protest termination, etc.

3. Cell Site Giveaway Management Module: provides the management functions of cell site Giveaway, such as cell phone, mobile numbers or coupon to protest inhabitants.


5. Vendor Management Module: includes Vendor and Contact Information Maintenance, and Vendor Appraisal Information Maintenance, etc.

6. Microwave Permit/License Management Module: includes Microwave Permit/ License application, suspending, changing, and cancellation.

3. Dismantle Management

1. Dismantle and Discharge Dismantle Approval Module: provides approval procedures to cell site dismantle or discharge dismantle.

2. Dismantle Scheduling Control Module: includes Cell Site Dismantle Schedule Control and claims delivery notice for unfinished items.

3. Dismantle Work Order Module: includes the initiation of the cell site Dismantle Work Order, Dispatching and Acceptance Test.