Web Based Automation for Network Inventory Creation

UC670

Presenter: Yestha Bhatt
Date: 15-07-2014
Event: ESRI UC, 2014
Agenda

1. Introduction
2. Usage of GIS in RJIL
3. Need of Web Based Automation for Network Inventory Creation
4. High Level Workflow
5. Implementation Approach
6. Detailed Process flow with use cases and Output
7. Conclusion
8. Challenges and Forward Path
Reliance Jio Infocomm Limited

- Only Telecom Company having Pan-India high speed wireless broadband Service Provider license and spectrum
- Services through : 4G LTE, WiFi and FTTx
- 850 towns + 50% of rural India
- Current Stage : LTE network rollout in next 2 months & FTTx rollout about to start
GIS Implementation in RJIL

Approx. 3,000+

Landbase available for 400+ cities

170K+ OFC route
100K+ Sites

Numbers indicate the total users in each functional group as per the locations assigned

Confidential
Reliance Jio Infocomm Limited
GIS in Network Plan and Build phase

**Wireless**

- WorkFlow Manager
- Planned Inventory Creation in NDD Generation
- Intercity / Intracity OFC Route Planning on Desktop & Web

**Intercity / IntraCity**

- Automated IFC Map Generation
- Planned Inventory Creation in NEE
- Change Management
- NDD Generation

**FTTx**

- Market Planning
- Building Survey
- High Level Design
- FTTx Engineering
- As-Built Generation
- Network Inventory Capture

**As-Built Generation**

- OSP Data Creation & Migration to NE

**Planning – Acquisition – Construction – Installation – Ready for service**
Need of Automation for Network Inventory Creation

- No additional GIS skilled resources required
- Develop a paperless and automated way of capturing network inventory
- Reduce the time gap between the execution and updation of inventory database
- Improve the accuracy of As-Built data capture
- Facilitate the construction progress monitoring on GIS
High Level Workflow

- Route Planning
- Assignment of Trench/Link Id
- ITP Form Updation
- T&D Generation
- DIT Generation
- OFC Blowing Generation
- GIS
- Model Creation
- Quality Check
- Work-Order Generation
- Migration to NE

ITP: Inspection Test Progress Report
T&D: Trenching and Ducting
DIT: Duct Integrity Test
User Groups

- GIS User
- System Administrator
- Business
- Network Planning & Engineering
- Construction Engineer
- Construction Manager
- Operations and Maintenance
View unassigned Links /Spans
View Link on Map
Assignment to Next User
ITP Form Updation
Types of ITP Forms

**Trenching and Ducting**
- Trenching ITP-030 & HDD ITP-001
- Ducting-ITP-031
- Rail & Road Crossing-ITP-034
- Bridge/Culvert Crossing-ITP-036
- Manhole/Handhole-ITP-033

**Duct Integrity Test**
- DIT ITP-042

**OFC Blowing**
- Blowing ITP-011
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>From</th>
<th>To</th>
<th>Actual Length in M.</th>
<th>ROW Ref. (Km/Line)</th>
<th>Trench Details</th>
<th>Bedding Details</th>
<th>Remarks</th>
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<tbody>
<tr>
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<td>127/1300</td>
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</table>

**COMMENT:** The Trench from 19/10 to 10/19 has been cleared for HDPE duct laying.

**Note:**
1. Start/End points and/or permanent objects from which we have to take reference.
2. Three Point location from the point (in the Millimeter). Pole/Road Line Permanent object on the field.
3. For reference point except in Millimeter, land surveyors, the available permanent object is the yard line.
4. In case, Meters are not available, then use any other permanent object as a reference.
5. Lab. Long should be in 5 digits in Decimal. For example: 78.123456.
6. Width & Depth should be in Metro. For example: 0.75
7. Offset distance from Center of Trench to Center of Road.
8. To capture the trench details.

**Start Point Coordinates:**
- LAT: 12°14’27”
- LON: 77°86’23”

**End Point Coordinates:**
- LAT: 13°26’18”
- LON: 74°59’23”

**Three Point Location at Start:**
<table>
<thead>
<tr>
<th>Pi</th>
<th>Type of Point</th>
<th>Lat</th>
<th>Long</th>
<th>Distance in M.</th>
<th>Type of Point</th>
<th>Lat</th>
<th>Long</th>
<th>Distance in M.</th>
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<td>Milestone</td>
<td>12°16’32”</td>
<td>77°86’23”</td>
<td>17.26374°</td>
<td>Pole</td>
<td>17°20’35”</td>
<td>74°56’73”</td>
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<td>Milestone</td>
<td>12°16’32”</td>
<td>77°86’23”</td>
<td>17.26374°</td>
<td>Pole</td>
<td>17°20’35”</td>
<td>74°56’73”</td>
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**Comments:**

- Contractor Representative: [Signature]
- Field Engineer: [Signature]
Sample Trenching ITP-030

![ITP As-Built Form](image)

<table>
<thead>
<tr>
<th>SL No.</th>
<th>Chainage (from 29M.)</th>
<th>Trench Details</th>
<th>Crossing</th>
<th>Authority</th>
<th>Methodology</th>
<th>Remarks</th>
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<td>Select</td>
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</table>

**COMMENT:** The Trench From 7.534 to 7.737 has been cleared for HDPE duct laying.

**Note:**
1. Start/End point should be Route Marker or Permanent object from which all reference points are taken.
2. Three Points location from the point like Mile Stone/ Tree/ Pole/ Road CL - Permanent Object on field.
3. If 3rd reference point should be Milestone, 2nd Road Centerline, 3rd available permanent object in field Pointtree etc.
4. Incase Milestone not available then capture any other permanent object in the field as reference.
5. Lat Long should be in 5 digit in Decimal-Degree format eg: 75.87227 20.18703
6. Trench width, Trench Depth, X-Y offset distance from Center of Trench to Center of Road.
7. Include 1 Km stretch details.
8. Start/End point must be entered to generate GIS View.
### ITP As-Built

#### Inspection Report HDPE Duct Laying

<table>
<thead>
<tr>
<th>Client</th>
<th>Contractor</th>
<th>Sub Contractor</th>
<th>Report No.</th>
<th>Date</th>
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<tr>
<td>RJIL</td>
<td>Ms Verma Infratel</td>
<td>13002882</td>
<td>033/1604</td>
<td>13-Aug-2013</td>
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#### Duct Joint Details

<table>
<thead>
<tr>
<th>SL No.</th>
<th>Chainage as per the trenching report</th>
<th>Actual Length</th>
<th>Release note</th>
<th>Location (Chainage)</th>
<th>Check cleanliness of duct at either end</th>
<th>Visual check for tightness of coupler</th>
<th>No. of Ducts laid as applicable</th>
<th>Duct Protection Type</th>
<th>Length</th>
<th>End Caps provided</th>
<th><strong>Span Type</strong></th>
<th><strong>Span Model</strong></th>
<th>Marker Type</th>
<th>Marker Location</th>
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</tbody>
</table>

**Note:**
- Certified that, end caps were provided with in this chainage of work done before closing for the day.
- Chainage should be same as Trenching chainage which is captured in report No. R4G-70-CQF-FMT-PR-030-02
- Duct laid from 7/534 to 7/737 has been cleared for Backfilling.
Generated OSP Network Inventory
Features

Adjustment of the T&D distance within the defined ‘From’ & ‘To’ latitude-longitude

Splitting the trench on placement of structure at the exact spatial location

Creation of point features with reference to 3 point distance

Model selection based on inventory models built in NE model builder

Re-work made easy for change in location of inventory

Compared to earlier manual method of inventory capture
- Per Km : 6 to 8 hours (Paper based mark-up + Digitization + Standardization + Migration)
- Per Km : 3 to 4 hours (ITP updation + Feature Generation)
Conclusion

- **Track and manage a dispersed workforce on a common platform in a disciplined and organized manner**
- **Standardization and consistency** across operations by centralizing As-Built management on central GIS database.
- **Paperless form** of ITP updation and physical inventory creation.
- **Increased user productivity** by automation of common activities and reducing repetition of manual updation activities.
- **Improved quality** of physical inventory data.
- **Effortlessly track** newly created inventory status and work progress using reports.
Challenges

- An algorithm is defined and executed at client side to move along the interval as defined in the ITP form to calculate the increase in performance.
- Same inventory feature cannot be edited by two or more users simultaneously.
- To capture the data in ArcGIS and to make it compatible with Network Engineer data model to avoid development of complex data migration tools.
- Auto-snapping & split of line feature on availability of point feature within the defined buffer distance.

Web Based Automation for Physical Network Inventory Creation
Path Ahead

- Development of native app on Mobile for physical inventory data capture

- Auto-snapping & split of line feature on availability of point feature within the defined buffer distance to capture cable splice data
Thank You