Creation of Multi-Layer GIS for E-governance & Planning

Using technology to increase Government capacity and capability in – Planning, Evaluation, Monitoring and Implementation
National Informatics Centre

- **The Mandate**

1. Provide Information Infrastructure on demand

2. Facilitate electronic delivery of services to the Government and Citizen
About NIC

Nation wide network with 70,000+ end users

Data Centres of NIC host 8000+ websites of Government

Largest Gigabit Network (NKN) with over 1500 knowledge institutes connected & to Global RENs

Internet Gateway more than 60Gbps connected five locations

VPN services

Present in all the 36 States/UTs and 648 Districts

Largest Indian Govt eMail Service

with more than 12 lakh accounts, 1.5 Peta Byte of storage,

Mails transacted: 24 Crores /Month

More than 40 crores SMS per month through NIC SMS Gateway

Applications Integrated: 1200

More than 8 million users access NIC portals everyday
Major e-Governance Initiatives supported by NIC

**eCourts**
13400+ courts across the country fully ICT enabled

**India Portal**
Virtual gateway to over 8000+ Indian Government websites

**IVFRT**
Implemented in 163 Missions, 81 ICPs, Biometric Enrollment at 79 Missions, OCI at 173 Missions and CONSPROM

**CPSMS**
Captures transactions of >17 lakh agencies with 23.77 crores funds

**ePanchayat**
160,000 Panchayats use for accounting purpose

**PDS-MMP**
Common Application Software for PDS operation

**eDistrict**
Implemented in Haryana, Kerala, MP, UP, Uttarakhand, TN.

**MCTS**
36 Million Mothers, 28 million children, 3.4 lakh verification calls per day

**ePrisons Suite**
Implemented at 700+ Prisons of 24 States.

**Transport**
Vahan & Sarathi System at 1000+ RTOs, National Register with more than 17 Crore Vehicles, 8 Crore Driving Licenses

**OCI**
Issued 20 Lac 44 Thousands 69 OCI docs

**Land Records**
450 million+ (~90%) of land records digitized

**NREGÁSoft**
13.18 crore Job Cards, 27.64 crore workers

**OCI**
Issued 20 Lac 44 Thousands 69 OCI docs

**eHospital/ORS**
ORS: 25 Hospitals joined. 1.40 Lakhs Appointments.
E-Hospital on Cloud: 5 Hospitals On-Boarded 2.40 Lakhs Registration

**PDS**
Common Application Software for PDS operation

**eDistrict**
Implemented in Haryana, Kerala, MP, UP, Uttarakhand, TN.

**Land Records**
450 million+ (~90%) of land records digitized

**Transport**
Vahan & Sarathi System at 1000+ RTOs, National Register with more than 17 Crore Vehicles, 8 Crore Driving Licenses

**WAMSI**
Implemented in 28 states, 3 lakh immovable properties’ records

**Agriculture**
6800 NADRS centres, 3500 Mandis (300 commodities) ICT enabled

**Scholarships**
(40 million),
**eCounselling**
(8.8 m students, 1.2 m seats),
**Treasuries Automation**
(16 States),
**Property Registration**
(3400 SROs),
**CGHS**
(253 dispensaries, 40 K patients/day),....

**eTaal**
2942 e-services with over 1330 cr etransactions
Summary: Initiatives of NIC on visualization through Maps & Images

- **1990**: Mapping of Delhi region with Aerial Photography.

- **1995**: Installation of PARAM for satellite image processing for All India mapping, GIS vector software and pilot application projects in natural resources, district planning & watershed etc.

- **2001**: Integration of data from multiple sources - Highlighted data gap between SOI maps and DOS Images.


- **2009**: Successful deployment of standards based Multilayer GIS framework with data from SOI, DOS, FSI, RGI etc. – Setting-up the core foundation of “National GIS”.

- **2010**: Web-based Architecture revised with International standards enabling integration of services e.g. Google, Bing, ESRI etc.

- **2011**: Launch of first All India map service- NICMAPS deploying Apps in multiple sectors – Telecom, Posts, Banks etc.

- **2012**: Participation in National GIS Mission Activities and further enhancement of Multi-Layer GIS Services using NICMAPS for larger Systems & Services for National GIS

- **2013**: Up-Scaling of Multi-Layer GIS Framework from 1:50 K to 1:10 K – A SFC project of NIC, DeitY, Deploying Multi-Layer GIS Platform for E-governance applications and enabling GIS on cloud infrastructure

- **2014**: Participation in National GIS Mission Activities and further enhancement of Multi-Layer GIS Services using NICMAPS for larger Systems & Services for National GIS
GIS and Utility Mapping Services

GIS and Remote Sensing Services:

• National GIS Platform Services for eGov & Planning
• Seamless Country wide base maps, satellite images and hybrid Maps with State/district/Sub district/Block/Village wise boundaries
• Pre-cached service at 14 levels (1:40 M to 1:4 K) & 23 feature layers

Utility Mapping Services:

• Utility mapping (1:1000 Scale) set up for Delhi Government
• Spatial Data Infrastructure available for Ahmedabad, Bangalore, Chennai, Hyderabad, Kolkata and Mumbai
Digital India

Digital India is a Programme to transform India into a digitally empowered society and knowledge
Vision of Digital India

Centered around 3 Key Areas

- Digital Infrastructure as a Utility to Every Citizen
- Governance & Service on Demand
- Digital Empowerment of Citizen

Leveraging GIS For Decision Support Systems & Development

GIS is a common technology platform and service cutting across key areas covered as Digital India Vision
Nine Pillars of Digital India

1. Broadband Highways
2. Universal Access to Phones
3. Public Access Internet Programme
4. e-Governance - Reforming Govt. through Technology
5. e-Kranti – Electronic Delivery of Services
6. Information for All
7. Electronics Manufacturing - Target NET ZERO Imports
8. IT for Jobs
9. Early Harvest Programme

National GIS Mission for Digital India:
GIS is a Technology for Planning, Decision-Making & Electronic Delivery of Services (Pillar-5), Geo-enabling e-Governance (Pillar-4) to facilitate location-based information for all (Pillar-6):
Multi-Layer GIS Systems & Applications
Location as “Primary Unit” for Digital India

- “Location” - Important dimension in Network Connected Digital World of Information Highways.

- “Geo-Tagging” of Location of Assets, Infrastructure, Natural and Human Resources - Essential requirement to understand ground reality of development process & services to be made available to citizens.

- “Geographical Information System (GIS)” as “Technology Platform” to facilitate Location-Specific “Governance & Services on Demand”, as key implementation strategy for “Knowledge –Driven-Digital India”.

- GIS to facilitate Planning, Decision-Support, Monitoring & Evaluation for Good Governance as well as Social Auditing of Government Action for Development with participation of citizens.
GIS as major E- (or G-) Governance Sub-System is an important lever to accelerate growth and increase focus in different domains.

Government
- Internal Security,
- Rural Development
- Financial Planning
- Infrastructure
- Agriculture
- Land Records

Education
- Research,
- Higher Education
- Technologists

Environment
- Climate
- Water,
- Land,
- Wildlife,
- Vegetation

Natural Resources
- Agriculture,
- Forestry,
- Mining,
- Petroleum,
- Pipeline

Utilities organizations –
- Telecom
- Power Management,
- Electricity
- Gas
- Water and Waste management

Businesses –
- Banking,
- Logistics,
- Real Estate,
- Retail,
- Media

Digital India demands Sustainable Framework for Location Based Services for Good Governance to fulfill the aspirations of Citizens of the country.
Multi-Layer GIS Platform

- A standards based framework to deploy Digital GIS Assets
- Represents common intent of major ministries/departments
- Part of larger e-gov initiatives to support backend governance applications
- Facilitate real-time update through departmental ownership and driving force
- Involvement and participation of citizens through crowd-sourcing
- e-gov applications to drive Location Based Services and facilitate use of “Maps” through “Apps” within the work-flow and process of governance needs
- Integration with Social Media for data authentication and social auditing

<table>
<thead>
<tr>
<th>Planning Services – National</th>
<th>1:1,00,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>- State &amp; Region</td>
<td>1:2,50,000</td>
</tr>
<tr>
<td>- District (with village)</td>
<td>1:50,000 to 1:10,000</td>
</tr>
<tr>
<td>- Urban/City/Utility</td>
<td>1:10,000 to 1:1000</td>
</tr>
<tr>
<td>Project Management Services</td>
<td>1:10,000 to 1:5000</td>
</tr>
<tr>
<td>Transaction Services (Cadastral Level)</td>
<td>1:2000 to 1:4000</td>
</tr>
<tr>
<td>Regulatory Services</td>
<td>1:10,000</td>
</tr>
</tbody>
</table>
Stakeholders

- Government Organizations – Ministries / Departments, PSUs etc.
- Data Producers – Spatial (Map) and Non-Spatial (Attribute)
- Universities, Researchers and Academicians
- Business, Entrepreneur & Industry
- Citizens
- NGOs
GIS overview of different stakeholders and NIC

**SOI**
- Base frame work data
- Surveying

**DOS**
- Satellite Images
- Wasteland Mapping

**Others**
- FSI - Forest Cover
- SLUSI - Soil
- CGWB - Ground Water

**Non-Spatial Data**
- RGI - Census 2001
- Educational Survey
- Health Survey
- NREGA
- Rural Roads

**NIC - GIS**
- Facilitator
- Standardization
- Integrator
- Dissemination-Enterprise

**External GIS Services**

- Internet Cloud

**External GIS Services**
Glimpses of Multi-layer GIS –

- Seamless Integration of Topographic Data over Satellite Imageries with attributes from various domains
- Multi-Scale Multi-Resolution Scalable Framework
# National & International Standards

<table>
<thead>
<tr>
<th>S. No</th>
<th>Spatial Data</th>
<th>Standard Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Administrative Units</td>
<td>Census 2001/2011 code: BGI Proprietary codification to address ABDB. Adopted by various organization within India.</td>
</tr>
<tr>
<td>2</td>
<td>Land use / cover, agriculture, Wasteland, Geology etc</td>
<td>NRIS Codes from DOS widely adopted by various Indian Organizations</td>
</tr>
<tr>
<td>3</td>
<td>Watershed and extensions</td>
<td>SLUSI Up to First five levels. A committee set up from MOA for harmonization there after for variations used by CGWB, DOS, SLUSI.</td>
</tr>
<tr>
<td>4</td>
<td>Forest Cover</td>
<td>FSI</td>
</tr>
<tr>
<td>5</td>
<td>Panchayat &amp; Habitations</td>
<td>LGD Directory, Min. of Panchayati Raj Div. of NIC</td>
</tr>
<tr>
<td>6</td>
<td>Parliamentary &amp; Assembly Constituencies</td>
<td>ECI codes</td>
</tr>
<tr>
<td>7</td>
<td>Soil Classification</td>
<td>NBSS&amp;LUP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard Type</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projection/Transformation of Spatial Data in Everest Datum to global standards</td>
<td>WGS 84 in compliance with EPSG standards adopted by Open Geo-Spatial Consortium (OGC)</td>
</tr>
<tr>
<td>Storage</td>
<td>Raster /vector inventories, Identification codes, Data format, projection, database etc.</td>
</tr>
<tr>
<td>Processing</td>
<td>Desktop processing environment, GIS tools, Web based solutions, Symbols, style etc.</td>
</tr>
<tr>
<td>Web Services</td>
<td>Setting up the web services and Publishing data on the Network etc.</td>
</tr>
<tr>
<td>Meta-Data</td>
<td>NSDI as well as OGC compliance</td>
</tr>
</tbody>
</table>

Note: Compliance with National as well as International Standards facilitated Digital GIS assets in standard format on one end and helped in integration of spatial data services across Indian as well as global data (maps & satellite images) platform and services.
# 23 layers of GIS

<table>
<thead>
<tr>
<th>S.No</th>
<th>Layer</th>
<th>Source organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Administrative Boundaries</td>
<td>SOI</td>
</tr>
<tr>
<td>2</td>
<td>Village Boundaries</td>
<td>SOI</td>
</tr>
<tr>
<td>3</td>
<td>Major Towns/Cities</td>
<td>SOI/NIC</td>
</tr>
<tr>
<td>4</td>
<td>Settlements</td>
<td>SOI/NIC</td>
</tr>
<tr>
<td>5</td>
<td>Roads</td>
<td>SOI/NIC</td>
</tr>
<tr>
<td>6</td>
<td>Railway/ Railway Stations</td>
<td>SOI/NIC</td>
</tr>
<tr>
<td>7</td>
<td>Forest Cover</td>
<td>FSI/NIC</td>
</tr>
<tr>
<td>8</td>
<td>Soil</td>
<td>NBSS&amp;LUP/NRMS</td>
</tr>
<tr>
<td>9</td>
<td>Watershed</td>
<td>AISLUS/CGWB/NRSA</td>
</tr>
<tr>
<td>10</td>
<td>Land Use/Land Cover(NRSA)</td>
<td>NRSA/CGWB/NRSA</td>
</tr>
<tr>
<td>11</td>
<td>Wasteland</td>
<td>NRSA/NIC</td>
</tr>
<tr>
<td>12</td>
<td>Wetland</td>
<td>NRSA/NIC</td>
</tr>
<tr>
<td>13</td>
<td>Waterbodies</td>
<td>SOI/NIC</td>
</tr>
<tr>
<td>14</td>
<td>Drainage(SOI)</td>
<td>SOI</td>
</tr>
<tr>
<td>15</td>
<td>Groundwater</td>
<td>CGWB</td>
</tr>
<tr>
<td>16</td>
<td>Agriculture</td>
<td>DOS/NRSA/NIC</td>
</tr>
<tr>
<td>17</td>
<td>Geology</td>
<td>GSI/CGWB/NIC</td>
</tr>
<tr>
<td>18</td>
<td>Hydro Geomorphology/Geology</td>
<td>GSI/CGWB/NRSA/NIC</td>
</tr>
<tr>
<td>19</td>
<td>Misc point data sets with attributes Hq, PO,PS, Airports etc.</td>
<td>SOI/NIC/NNRMS</td>
</tr>
<tr>
<td>20</td>
<td>Satellite image- Multispectral data Georeferenced mosaic across the country from AWIFS (56m),LISS III(23m), for extraction of Natural Resources features.</td>
<td>SOI/NIC/NNRMS</td>
</tr>
<tr>
<td>21</td>
<td>IRS Satellite 5.8 m Pancromatic image mosaic of entire country</td>
<td>NRSA/NIC</td>
</tr>
<tr>
<td>22</td>
<td>Quik Bird high resolution satellite image for 580 district Hq.</td>
<td>SOI</td>
</tr>
<tr>
<td>23</td>
<td>Contours, Elevation, Height, Slope/Aspect etc.</td>
<td>SOI</td>
</tr>
</tbody>
</table>
Multi-Layer GIS Platform – NICMAPS

- Seamless Country wide base maps, satellite images and hybrid Maps
- Pre-cached service at 12 levels (1:40 M to 1:18 K) & 23 feature layers
- Multi-Scale & Multi-Resolution Map & Satellite imagery service
- Terrain Base Map service, using DEM derived from 20m Contour.
- Geo-code web services with (12 lakhs locations)
- State/district/Sub district/Block wise viewing (clip function)
- Updates of vector dataset
- Token based security to access of GIS web services.
- Interoperability of NICMAPS web service with global services

URL: http://nicmaps.rsgis.nic.in/ or http://bharatmaps.gov.in/ or http://bharatmaps.nic.in/
NICMAPS

Layers

- National/ State/ District
- Village HQs & Boundaries
- Census Town
- Habitations
- Settlements and
- Its footprints
- Roads
- Railway lines and stations
- Airports
- Surface water features
- Historical Places
- National Parks
- Forests

Map Scales

1: 40 M
1: 20 M
1: 10 M
1: 5 M
1: 2.5 M
1: 1 M
1: 500 K
1: 250 K
1: 150 K
1: 72 K
1: 36 K
1: 18 K
BHARATMAPS is a Multi Layered GIS platform/web service comprising of seamless country wide base maps, satellite images and hybrid Maps aligned as per the global geo-spatial standards and is an essential component of Digital India for electronics delivery of services for planning and good Governance.

**Other Utilities in G to G domain:**

a) Online Thematic Map: This enables stakeholders to upload a CSV file and create self composed map
b) Map the Neighborhood: This utility enables stakeholders to map the various public assets on GIS mapped. This will be utilized for controlled crowd sourcing from Govt. users.

[http://bharatmaps.nic.in](http://bharatmaps.nic.in)
## Digital GIS Assets

### Top – Down

| Digital Topographic Data around SOI Reference Systems (Scale- 1:1M, 1:250K, 1:50 K & 1:10 K for entire country and 1:10 K, 1:2k/1:1K for Urban Areas/Cities) |
| Satellite Imageries from DOS (56m, 23.5m, 5.8m, 2.5 m) |
| Thematic Maps (Scale 1:50K) from Multiple Sources – |
| (a) Land Use/Land Cover |
| (b) Wasteland |
| (c) Forest |
| (d) Soil |
| (e) Watershed |
| (f) Geology/Geomorphology/Hydro-Geology |
| (g) Mineral Resources etc. |
| Asset/Infrastructure/Point of Interest (POI) Locations |
| Non-Spatial (Attribute) Data from Line Ministries/Departments |
| Any other Application related Spatial & Non-spatial Data based on requirements |

### Bottom-Up

| Digital Cadastral Map (1:4K) as Base Map Geo-Referenced using High Resolution Satellite Imagery |
| Satellite Imagery Resolution from 1 m to 50 cm |
| (a) Thematic Maps Based on Detailed Thematic Surveys at Cadastral Level. |
| (b) Thematic Maps at 1:10 K for themes similar to thematic maps in 1:50 K |
| (c) Themes derived from data such as Soil Health Card, Land Use Statistics etc. |
| Asset/Infrastructure/Point of Interest (POI) Locations, geo-tagged and linked to Survey Numbers in Cadastral Base |
| Non-Spatial (Attribute) Data from Line Ministries/Departments, geo-tagged and linked to Survey Numbers in Cadastral Base |
| Any other Application related Spatial & Non-spatial Data based on requirements |
Geo-Enabling NeGP through Digital India - Probable List of GIS DSS Application

| Plan-GIS for Planning Commission | GIS for Aadhar integrated with UID |
| Plan-GIS for Planning Commission | GIS for public services as part of PIII services in various areas |
| Plan-GIS for Planning Commission | GIS for Security as a support for the security programmes of Ministry of Home Affairs |
| Plan-GIS for Planning Commission | GIS for Infrastructure sector be they in roads and highways, rail systems, airport infrastructure or other social infrastructure |
| Plan-GIS for Planning Commission | GIS for Disaster Management Support for supporting management of disaster for NDMA |
| Plan-GIS for Planning Commission | GIS data access applications for use for Defence GIS requirements |
| Plan-GIS for Planning Commission | GIS for Infrastructure sector be they in roads and highways, rail systems, airport infrastructure or other social infrastructure |
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The National Agricultural Market Atlas is a GIS based web application to view the agricultural markets linked to the AGMARKNET nodes for daily market reporting, commodity transactions and commodity prices etc.

- Markets reported
- Commodity Arrivals
- Commodity Prices
- Markets reported below MSP
- Top Ten Commodities and markets
- Monthly cumulative arrivals of a commodity
- Yearly cumulative arrivals of a commodity
- Markets not reported
- Market profile
- Best Price to farmer
- Best Price for a commodity

URL://nama.nic.in/agmarknet/
Web GIS for Village Level Mapping of Demography and Amenities
Thematic Atlas for the entire Country

National GIS Project

STATE ATLAS - ANDHRA PRADESH

Number of Primary Schools

Source: 51 OSS 2011
Map Commissioned NC
- Offsite emergency planning tool developed using Map Objects.
- Chemicals modeling using ARCHIE/ALOHA integrated with MO. Over 2000 footprints generated.
- Implemented in 40 districts & hazardous Industries.
- Response Inf. data sheets for 463 chemicals.
Panchayatiraj GIS Services

1. Using Census Codified Local Government Directory (LGD) for Mapping of GPs and locations, to enhance the common base map for various e-gov schemes and programmes.

2. Integration of NIC GIS Map Service with work-flow and attributes of e- Panchayat Suite, namely Panchayat Assets and monitoring of various schemes and programmes.
List of Applications

1. http://serviceonline.gov.in (Service Delivery Framework)
1. Snapshots
GIS for CPSMS FUND TRACKING SYSTEM AND DIRECT BENEFIT TRANSFER

- CPSMS GIS application requires a map service
- Map service is provided by NIC
- URL of map service is: http://gis1.nic.in/nicgis1/rest/services/cpsms/MapServer
- Layers used:
  - State
  - District
  - Sub District
- MIS data is provided by CPSMS
- This deploys cloud based secured map service within the workflow of CPSMS framework.
Snapshots
Mapping of Banking Infrastructure

- Banking application integrates a geo processing Service apart from using standard map service
- Layers used:
  - State
  - District
  - Sub District
  - Village as a Point
- MIS data is provided by Dept. of Financial Services
- Banking layers

This is now further scaled up to map Financial Inclusion Infrastructure under the guidance of DBT Mission.
Gap Analysis snapshots
Mapping of Telecom Infrastructure

• Telecom Base map services of NIC, ESRI and other standard map service

• Layers used:
  – Administrative Boundary
  – Places including State Hq./ District Hq./ Sub District Hq. / GPs/ Village points
  – Telecom Asset layers from BSNL/ Railtel/ PGCIL
  – BBNL Telecom layers
## Telecom GIS Data Asset

<table>
<thead>
<tr>
<th>S.No.</th>
<th>CPSU Operator &amp; Assets</th>
<th>Assets Mapped on GIS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong></td>
<td><strong>BSNL</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) LD OFC</td>
<td>(a) 2,25,857 rkm</td>
</tr>
<tr>
<td></td>
<td>(b) SSA OFC</td>
<td>(b) 6,27,694 rkm ; Total (a) + (b) = 8,53,551 rkm</td>
</tr>
<tr>
<td></td>
<td>- 26 Circles &amp; 334 SSAs Covered</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(c) Exchange</td>
<td>(c) 36,503 (Total); 35,147 Mapped for 26 Circles</td>
</tr>
<tr>
<td></td>
<td>(d) Towers (WPC data as on 31/10/2010)</td>
<td>(d) 86,374 with unique locations 64,384</td>
</tr>
<tr>
<td><strong>B.</strong></td>
<td><strong>RAILTEL</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) OFC Length</td>
<td>(a) 54,158 rkm</td>
</tr>
<tr>
<td></td>
<td>(b) Railway Stations (PoPs)</td>
<td>(b) 6,214</td>
</tr>
<tr>
<td></td>
<td>(c) Level Crossings Gates (with PoPs)</td>
<td>(c) 19,313</td>
</tr>
<tr>
<td></td>
<td>(d) NE OFC</td>
<td>(d) 18,000 rkm (app.)</td>
</tr>
<tr>
<td></td>
<td>(e) NE PoPs</td>
<td>(e) 525</td>
</tr>
<tr>
<td><strong>C.</strong></td>
<td><strong>PGCIL</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) Transmission Towers</td>
<td>(a) 1,40,780</td>
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<tr>
<td></td>
<td>(b) Transmission Towers with Junction Box</td>
<td>(b) 4,274</td>
</tr>
<tr>
<td></td>
<td>(c) Transmission Towers with exiting OPGW/planned</td>
<td>(c) 65,642; OPGW Length – 15,000 rkm</td>
</tr>
<tr>
<td></td>
<td>(d) Transmission Lines</td>
<td>(d) 416</td>
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<tr>
<td></td>
<td>(e) Underground (UG) Lines</td>
<td>(e) 17</td>
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<tr>
<td></td>
<td>(f) Underground Fiber</td>
<td>(f) 2085 rkm</td>
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<td>(g) PoPs &amp; Repeaters</td>
<td>(g) 205</td>
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<td><strong>D.</strong></td>
<td><strong>GAILTEL</strong></td>
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<tr>
<td></td>
<td>(a) OFC Length</td>
<td>(a) 2155 rkm</td>
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<tr>
<td></td>
<td>(b) PoPs</td>
<td>(b) 73</td>
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<tr>
<td><strong>E.</strong></td>
<td><strong>Oil India</strong></td>
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<tr>
<td></td>
<td>(a) OFC Length</td>
<td>(a) 1060 rkm</td>
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<td></td>
<td>(b) PoP</td>
<td>(b) 28</td>
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<td></td>
<td>(c) Towers</td>
<td>(c) 31</td>
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<tr>
<td><strong>F.</strong></td>
<td><strong>Private TSPs Tower/BTS</strong></td>
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<tr>
<td></td>
<td>(a) Towers</td>
<td>(a) Towers : 6,37,447</td>
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<tr>
<td></td>
<td>(b) Services</td>
<td>(b) Services : 13,56,772</td>
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</table>
Telecom Tools & Services Developed

1. Web based Asset Capture/Digitizer Tool
2. Web GIS based Asset Editing and Validation Application
3. Telecom GIS Portal for Visualization Services
4. BSNL GIS Dash Board
5. OFC Interactive PDF Maps as pre-field information to BBNL/CPSUs for detailed NOFN Survey
National GIS Framework as Common Service Delivery Platform
(Content: Base Data viz. Roads, Village/GPs, River, Forest, Demography etc. & Services)

**NOFN GIS FRAMEWORK**

- **BSNL – GIS**
  - (OFC Routes – LD, SSA, Exchanges/Towers/PoPs)

- **RAILTEL-GIS**
  - (Railway Lines/OFC Routes, Railway Stations, Level Crossings, Towers/PoPs)

- **PGCIL – GIS**
  - (Tr. Towers, OPGW, Junction Box, Tr. Lines, UG Lines, PoPs & Repeaters)

- **NOFN – Execution Agencies**

**NOFN GIS**
- (Existing/Incremental Asset Inventory, Network Planning etc.)

**Integrated Telecom GIS Asset**
High Level View for BBNL GIS

Data Preparation & Processing

Network Layer (OSP)
- Existing OFC Layer
- Actual Network (After Survey)
- Network Attributes (Only OSP Related)
- Route Survey Layer
- Updated Network after Commissioning
- Base Layer
  - Bhuvan Map Service
  - External global Map Services
  - Limited Satellite Images for critical areas
- Existing Multi-layer GIS framework

Application Layer
- Data Viewing
- Data Editing
- Dash Board
- User Authentication
- Role base access
- Report Generation & Analysis

Internal Users
- BBNL
- DOT
- PSU’s

External Users
- Other Government Department/Ministries
- Common Citizen

Data Layer

Application for Integrating with NMS/OSS
- NMS Server
- CRM Server
- Billing Server
- ERP Server

Enterprise GIS Software, IT Security Software, Control & Monitoring Systems

NIC Data Centre Infrastructure
Up-Scaling of Existing Multi-Layer GIS Framework in 1:50,000 Scale to 1:10,000 Scale using High Resolution Satellite Data (2.5 m to 1 m or higher)

Note: This is to fulfill the larger goals of National GIS Mission and has been taken as pre-investment from NIC, DietY to leverage GIS platform services for E-governance.
Feature Extraction using High Resolution Data

- Feature Extraction for Layers Extracted:
  - Road
  - Railway
  - River/Drainage
  - Canal – Line/Polygon
  - Water Bodies
  - Settlements

- Web Based GIS Data Creation Tool

- Deployment of Topographic Map & Image Service for feature Extraction, referencing & alignment and attribution in secured environment

- Attribution is carried out using SOI and other open source data. Further enhancement of content through states & users
## GIS Application & Services

### Service Level Classification:
- Requirement/user needs based
- Driven by e-gov programs/schemes
- Scale – 1M, 1:250k, 1:50 K, 1:10 K or higher depending upon
  - Level of Planning/Decision-Making
  - Level of Granularity of Attributes
  - Spatial Layers needed as base
  - Service Definition for G2G, G2C or G2B

Note: Attribute & Content are scale independent. Granularity of attributes decides level of services and content/scale of base layer

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Sectors</th>
<th>Ministry/Department</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Rural Development</td>
<td>MRD</td>
<td>MGNREGA &amp; Land Records</td>
</tr>
<tr>
<td>3.</td>
<td>Banking</td>
<td>DFS</td>
<td>GIS for financial Inclusion</td>
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<tr>
<td>4.</td>
<td>Other Sectors</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(a) IAP Districts Mapping</td>
<td>Planning Commission</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) Telecom</td>
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<td></td>
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<tr>
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<td>(c) Agriculture Market Atlas</td>
<td>DOT, BBNL, BSNL, RAILTEL, PGCIL MoA</td>
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</tr>
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<td></td>
<td>(d) Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(e) Drinking Water</td>
<td>NCERT</td>
<td></td>
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<tr>
<td></td>
<td>(f) Ground Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(g) Total Sanitation Campaign Watershed</td>
<td>CGWB MRD</td>
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<td>(h) MoA, DoLR</td>
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<tr>
<td>5.</td>
<td>State GIS</td>
<td>Six States namely A.P., Orissa, T.N., Bihar, M.P. and Assam</td>
<td>Example Bihar State GIS Services</td>
</tr>
</tbody>
</table>
Compose Map – Self Service Maps

GIS Experience on a Client.....

• Web browser based client

• Users can begin their online GIS experience

• Includes Map Viewer
NGIS moves Embedding in Min / Deptt. Website
Dash Boards - BSNL
Utility Mapping Services

- Digital Basemap of the Scale of 1:1000 of Seven Metro cities is available online in G2G mode.
- Digital Basemap is located in NDCSP and can be accessed through secured connection.
- Cities Departments are using these maps for mapping and managing their assets
- The cities are:
  - Ahmedabad,
  - Bengaluru,
  - Chennai,
  - Delhi,
  - Hyderabad,
  - Kolkata,
  - Mumbai
Slum Rehabilitation Authority, Mumbai

- Slum Rehabilitation Authority (SRA) is accessing the Mumbai Digital Basemap and mapping their Slum boundaries with the accuracy of 6 cm.
- UMD established a GIS cell in SRA premises to analyze and updating of the data.
- Slum boundaries are surveyed using latest technology like GPS.
- Slums are also surveyed using Lidar and get the accurate 3D map which will superimpose on the Mumbai Basemap.
- SRA complete 70% of the GIS work in just 3 months using Mumbai Basemap.
- This will give a complete and accurate prime land detail to SRA to plan for making it commercial and residential purposes.
Department of Post

- Six Metro cities digital basemap are being used by the respective regional postal department for their pincode boundaries, post offices, letter box and beat boundaries.
- Beat Route also mapped and geo-referenced with cities digital basemap.
- DOP official enter their data on their desktop after providing a 2 days training.
- A web edit application is developed for them to enter their data.
- Basemap is accessed to their office desktop from the NDCSP.
Department of Post

- A portal for location letterbox and post office has been created for public using generic basemap of six cities.
- Portal gives you location of the pin code with pin code boundaries, post office, letterbox and Beat (Postman) boundaries
- Application also developed to locate nearest PO or Letterbox near to your location
- Post office or Letter box also can be located nearest to the route you are moving from Point A to Point B.
Details of an individual property

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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<tr>
<td>propertyLandType</td>
<td>O</td>
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<td>propertyZoneCode</td>
<td>S</td>
</tr>
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<td>propertySectionCode</td>
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<tr>
<td>propertyBlockNo</td>
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<tr>
<td>propertyPlotNo</td>
<td>D-346, DEFENCE COLONY</td>
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<td>propertyOriginDate</td>
<td>RAJANI BAHIL</td>
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<td>propertyLessor</td>
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<td>propertyFrehold</td>
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</table>
Land use
Land Parcel Information System
Address System

Address Tool

40, Mayurdhwaj Apt., 92
3-D map

- Ahmedabad
- Mumbai
- Hyderabad
- Bangaluru
- Kolkata
- Chennai
- Delhi
Basemap – Sewage Network
Property-tax Module

- To enhance the collection of property-tax.
- Identify assessed and non-assessed properties on the map.
- Property details can be viewed.
- Actual and calculated plinth-area can be viewed and verified for better tax collection.
- GHMC can isolate the plinth areas for un-assessed properties to improve the collection of Property tax.
Street Lights in Ward 100
Grievance Module

- Helps to register a complaint online on roads, street lights, dumper bins etc.
- Authorized users can register a complaint.
- While logging a complaint public can exactly mark the location of the fault on the Map.
- Can check the status online.
Information on Crimes by clicking on the map

Crime Locations - Property Crime

<table>
<thead>
<tr>
<th>Station</th>
<th>22</th>
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</thead>
<tbody>
<tr>
<td>Crime No</td>
<td>26/10</td>
</tr>
<tr>
<td>Crime Case</td>
<td>Property</td>
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</tbody>
</table>

Property Crime

| CRIME NO | 26/10 |
| OCCURANCE DATE | 2010-01-17 |
| COMPLAINT | Rajendran, M/a-S/L,S/o.Subra mani.No.3, Salavamuthaiah Mudali 3rd Street, Royapettah, Chennai-14 |
| ACCUSED | Not Known |
| DATE OF REGISTRATION | 2010-01-18 |
State GIS Initiatives using Common GIS Assets & Services from Multi-Layer GIS Platform at NIC

1. Tamil Nadu GIS
2. Bihar GIS
3. MP GIS
4. UP GIS
5. Punjab GIS
6. Odisha GIS
7. Puducherry GIS
8. Assam GIS

Further Interaction is on for Haryana, AP & Telengana, Karnataka, Chandigarh and so on.
Software / Technology used by NIC-TNSC

Designed & Developed many GIS based G2C / G2E / G2G (Intranet) Web applications, open source software has been used for dissemination activities

- UMN MapServer – GIS Server
  [http://mapserver.org](http://mapserver.org)
- PostgreSQL / PostGIS – GIS Database
  [http://postgis.refractions.net](http://postgis.refractions.net)
- GeoServer – GIS Web Services (WMS, WFS)
  [http://geoserver.org](http://geoserver.org)
- PHP – Server side scripting language
  [http://php.net](http://php.net)
- Leaflet – HTML5 – CSS3 based JavaScript framework
  [http://leafletjs.com](http://leafletjs.com)
- OpenLayers – AJAX based rendering
  [http://openlayers.org](http://openlayers.org)
- GeoExt – Javascript Framework for RIA
  [http://geoext.org](http://geoext.org)
- Routing – pgRouting (PostGIS based Shortest Path using Dijkstra)
Creation / Editing of Line Features
Creation / Editing of Line Features
Revenue Villages of Puducherry district with details of Common Service Centre
GIS Portal for Economic and Statistical Organization (ESO), Govt. of Punjab

16 Key Applications/Areas is being identified as part of State GIS Portal as below

• 1 Animal Husbandry
• 2 Health
• 3 Education
• 4 SUWIDHA
• 5 Irrigation
• 6 Tourism
• 7 Census
• 8 MGNREGA
• 9 MP Local Area Development Scheme
• 10 Sanitation
• 11 Cadastral Mapping (One district)
• 12 Assessment of soil quality (One block)
• 13 Carbon Accounting System (One Block)
• 14 Crop-land Suitability (Two districts)
• 15 Municipality (One town)
• 16 Wetland mapping (Three wetland)

The Project is to be implemented using NIC MAPS Services.
GIS Application for Punjab Mandi Board

Objectives
- Building Spatial Data of Mandi Locations & Boundaries and Rural Link Roads
- Integration of Spatial Data with existing MIS
- Development of a Web-based GIS Application
- Deployment of the Application in NIC Cloud

Features:
(a) Web Editor for Roads and Mandis
- Map Viewer
- Imageries as base maps
- Measure
- Village Search
- Line/Point Creation
- Split & Delete

(b) Visualization Application
- Map Viewer
- Identify
- Measurement
- Buffer and Search
- Query Builder
- Thematic Mapping
- Print
A web based GIS (Geographical Information System) framework, “Srishti” built-up around the village boundaries polygon uniquely identified which can be used by all the departments.

Natural Resource Information System (NRIS): District wise following layers of natural resources are available:

- Rail Track
- Road
- Canal
- Forest
- Structural Lineament
- Drainage Line
- Drainage Polygon
- Land Category
- Ground Water
- Lithological
- Land Use-Land Cover
- Watershed
Bihar Infrastructure Mapping—Geomatics Oriented Application Model

"Every object present on the Earth can be geo referenced"

GIS, GPS & Remote Sensing

Joint Initiative of

http://gis.bih.nic.in/

Govt of India
National Informatics Centre
Bihar

Department of IT

Govt of India
National Informatics Centre
Bihar
Conclusion

• NIC is leveraging multi-layer GIS Platform Services for e-gov and Planning.

• GIS platform services using 1:50 K base map, satellite data up to 5.8 m, and attributes from various application domain is already in use and is now further scaled up, up to 1 meter or higher.

• Use and Deployment of High Resolution Satellite Data and High Scale Maps (1:10 K or Higher) as per the needs of the user in e-gov space is national requirement for location and area based services.

• New Version of GIS Platform is available as “BHARAT MAPS” by NIC, DeitY.

• Bhartmaps is an effort in the direction of Service Oriented Multi-Layer GIS Framework at National Level with strong linkages with Central Ministries/Departments and State GIS Systems, integrating top-down and bottom-up systems seamlessly with respect to levels of decision making, planning, monitoring & evaluation.

• The effort is in the direction of enabling Geo-Spatial Services within the workflow of e-governance systems and hence addressing the primary goal of NGIS as cloud based service infrastructure for Electronic Delivery of Services for Good Governance under Digital India Programme.
Thank You
vishnu@nic.in