The Information Highway

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Presentation Outline

- **Elements of the I-way**
  - Network Equipments & Transmission Media
  - Last Mile
  - Global Information Distribution Networks
- **Public Policy Issues shaping the I-Way scenario**
  - NTP-2012
  - Net Neutrality
  - Bharatnet
  - IPv6 Policy & Transition Status
  - M2M /IoT Policy
  - Cloud Computing Initiatives
- **Applications – Drivers of the I-Way**
- Digital India Initiatives
- Smart City Initiatives
- **India ICT Strategy**
- **Challenges for the Future**
- **Conclusion**

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Elements of the I-Way

- **Network Equipments & Transmission Media**
  - Set top Boxes
  - Broadband modems
  - Digital switches
  - Routers
  - Hubs
  - OFC, Microwave etc.
- **Last Mile Access**
  - Telephone based infrastructure
  - Cable based infrastructure
  - Wireless infrastructure (Mobile, WiFi, Satellite etc.)
- **Global Information Distribution Networks**
  - Commercial / Enterprise online infrastructures (e.g. Microsoft Network, Apache servers)
  - Content Delivery Networks (Google, Akamai, Yahoo, Netflix etc.)
  - Cloud etc.

Policy Issues shaping the I-Way scenario

- NTP-2012

- Net Neutrality

- Bharatnet

- IPv6 Policy & Transition Status

- M2M/IoT Policy

- Cloud Computing Initiatives

- Digital India Initiatives

- Smart City Initiatives

NTP-2012

- ➢ Released by Government in June-2012
- ➢ Thrust areas

  -Rural Teledensity

  -Broadband

  -Convergence

  -Liberalization of spectrum

  - Consumer Focus

  -Cloud Computing

Net Neutrality

- No single worldwide definition of Net Neutrality

In common parlance Net neutrality means ensuring that all services are provided

- ✓ *to all parties,*
- ✓ *over the same quality of Internet pipe,*
- ✓ *with no degradation based on the service chosen by the end user,*
- ✓ *at the same cost.*

Overview of Regulatory Approaches in different Regimes

	Cautious observers	**Tentative refiners**	**Active reformers**
Measures taken	No specific measures	Light-handed net neutrality measures: e.g., transparency, lowering switching barriers, minimum QoS	Specific net neutrality measures: e.g., no blocking, no discrimination in treatment of traffic
Example countries	Australia Republic of Korea New Zealand	European Commission Japan United Kingdom	US, Brazil, Chile, France Netherlands, Singapore

Bharatnet

Background

1. World Bank study estimate - 10% increase in broadband connectivity leads to 1.38% increase in Gross Domestic Product(GDP).

2. Present Broadband penetration in India at present is less than 2%

Establishment of NOFN (National Optical Fiber Network) / Bharatnet

1. Set up on 25/10/211 to provide connectivity to 2,50,000 Gram Panchayats of the country to provide high speed broadband

2. To facilitate ICT applications such as e-Commerce, e-Banking, e-Governance, e-Education and Tele-medicine etc.

IPv6 Policy & Transition Status

Government Policy & Roadmap

- **National IPv6 Deployment Roadmap** ; **Released in July 2010**
- **National IPv6 Deployment Roadmap-II** ; **Released in March 2013**

IPv6 Transition Status

- **Global Scenario**:
  - As per Asia Pacific Network Information Centre (APNIC) report India stands at 45th position **with 0.7% IPv6 traffic**. The top position is held Belgium (47% IPv6 traffic), followed by Switzerland (32%) and US (29%).
  - As per Google statistics, the percentage of users that access Google over IPv6 stands at 10.2%.

- **Indian Scenario**:
- *Service Providers (Major)*:

Enterprise	Retail Wireline	Retail Wireless
- offered by 27. - 20 are IPv6 ready.	- offered by 18 - 8 are IPv6 ready.	- offered by 18 - 4 are IPv6 ready.

Government Organisations:

- Each Central Ministry/Department and State/UT has appointed IPv6 nodal officer to oversee IPv6 transition.
- The instructions to procure IPv6 ready ICT equipment issued.
- They are on the path to transit to IPv6 as per timelines of Roadmap (Dec 2017).

IPv6 Policy & Transition Status

Content Providers:

- A large number of the top content providers (e.g. Google, Yahoo, Facebook, Flipkart, Wikipedia, Youtube etc.) are IPv6 ready.

- The websites of 13 nationalised banks & 4 private banks are IPv6 ready.

- The websites of DoT, RBI, MP State etc. are IPv6 ready while the websites of other Ministries/Departments/States/UTs are in process of transition.

Equipment Manufacturers:

- All major mobile handset manufacturers support IPv6 on all newly launched devices (2.5 G & above) w.e.f. 01-07-2014 in accordance with the Roadmap v-II

Machine to Machine (M2M) / IoT (Internet of Things), Policy

M2M Or IOT – The Evolution

Pre-internet	Internet of CONTENT	Internet of SERVICES	Internet of PEOPLE	Internet of THINGS
"HUMAN TO HUMAN"	"WWW"	"WEB 2.0"	"SOCIAL MEDIA"	"MACHINE TO MACHINE"
• Fixed & mobile telephony • SMS	• e-mail • Information • Entertainment • …	• e-productivity • e-commerce • …	• Skype • Facebook • YouTube • …	• Identification, tracking, monitoring, metering, … • Automation, actuation, payment, … • …
+ IP networks	+ IT platforms & services	+ devices & apps	+ sensors, more devices & tags, big data	+ ambient context, data semantics

Source: Alcatel-Lucent

The **Internet** gave us the opportunity to connect in ways we could never have dreamed possible.
The **Internet of Things** will take us beyond connection to become part of a living, moving, **global nervous system**

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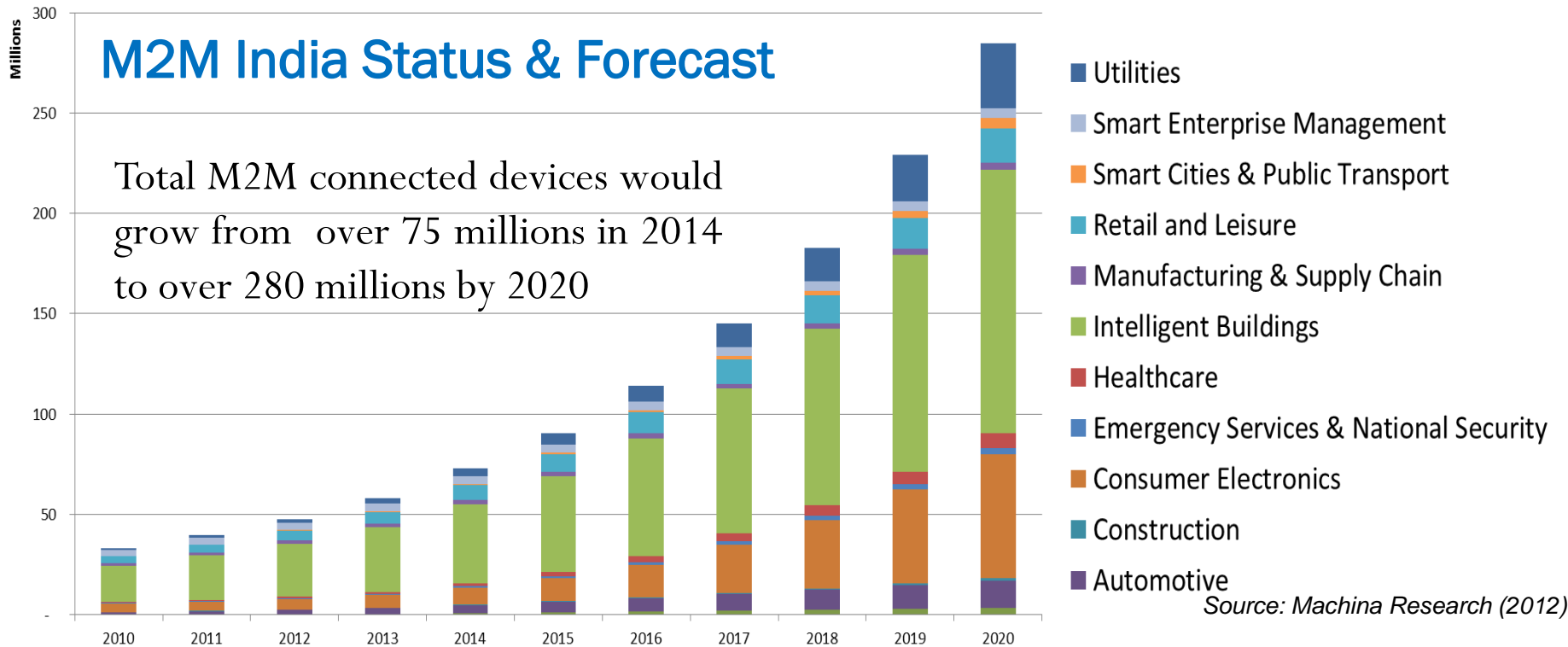# Telecom as underlying Infrastructure

M2M Deployment Across Globe

➢ By the end of 2020 there will be between 26 billion and 50 billion connected devices globally up from approx. 12.5 billion now

➢ Global M2M revenue forecast is 1.2 trillion US$ in 2020 as compared to 200 billion US$ in 2012-13

➢ Asia is Fastest growing region for M2M with a 55% CAGR followed by Latin America (44%) and Africa(41%)

✓ **Smart traffic**: An adaptive traffic system in USA reduced 50% serious injury in crashes

✓ **Smart water:** UK developed innovative smart metering services to save 3.6 million liters of water leak each day

✓ **Smart metering**: In Italy, 30 million properties already have M2M electricity meters

✓ **Smart fleets**: 435,000+ fleet management solutions already deployed in Europe

✓ **Smart devices**: For home automation various MNC' sells over 1 million smart devices in a week

Source: ITU, GSMA, Machina research

M2M India Status & Forecast

Total M2M connected devices would grow from over 75 millions in 2014 to over 280 millions by 2020

Source: Machina Research (2012)

Legend:
- Utilities
- Smart Enterprise Management
- Smart Cities & Public Transport
- Retail and Leisure
- Manufacturing & Supply Chain
- Intelligent Buildings
- Healthcare
- Emergency Services & National Security
- Consumer Electronics
- Construction
- Automotive

"National M2M Roadmap" released by the Government on 12.05.2015 in a conference on '*Smart Infrastructure: Supporting Policies and Regulations for M2M Communications*'

Policy & Regulatory Highlights in M2M Roadmap

- Mechanism for Registration of MSP (M2M Service Provider)
- KYC Norms for M2M
- M2M SIMs in Permanent International Roaming state
- Soft, Embedded & Virtual SIMS in M2M
- Data Security Aspects of M2M
- Health/ Safety Regulations and environmental guidelines:
- Location and connectivity Guidelines:
- Spectrum Requirement in M2M
- Specific Numbering Plan for M2M
- Roaming issues in M2M
- M2M Standard development
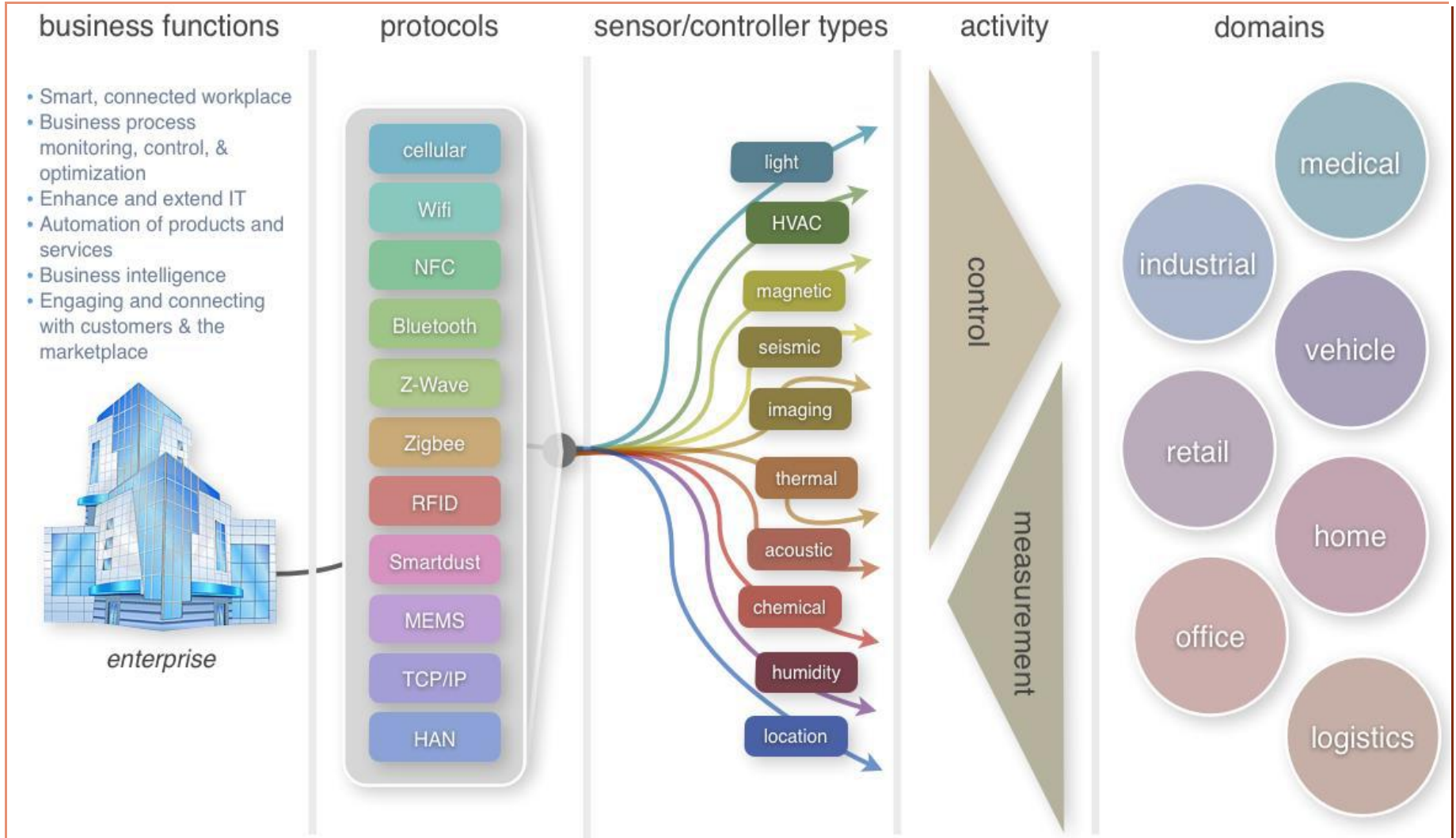- Supporting "*Make in India*" through M2M adoption

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Cloud Computing Initiatives

Issues to be addressed at large for India to be a hub for Cloud Computing

- Data Protection & Privacy

- Jurisdictional laws

- Visibility/Transparency of procedures/practices

- Data location / Export Control (Transflow of Information)

- LEA related investigation & National security issues

- Infrastructure issues

  - Land, Power, Human resources, Connectivity & Bandwidth

- Safety norms from vendors sudden exit

- Contractual agreements (Data Deletion / Data segregation, data ownership & control, SLAs)

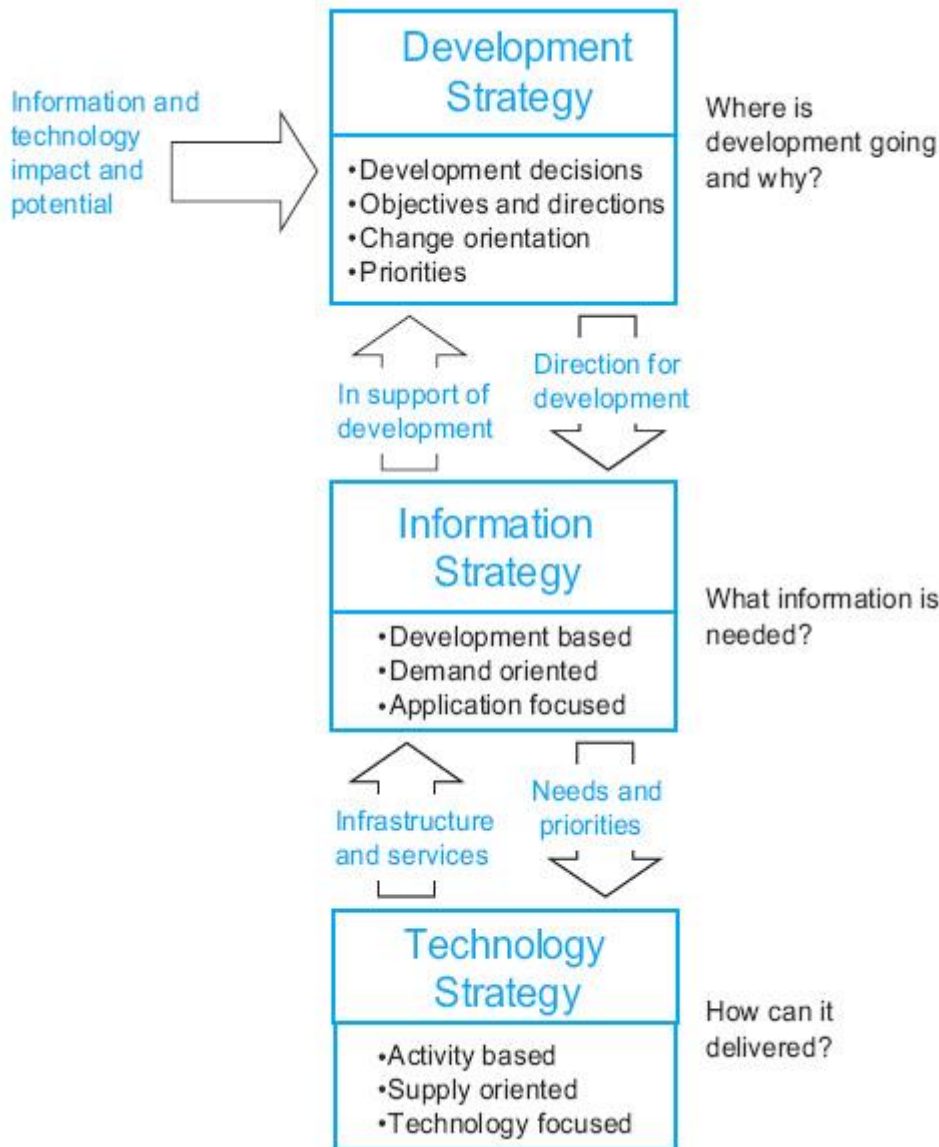- Classification of data based on sensitivity

- Disaster Recovery

- Taxation

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Applications
(Drivers of the Information Highway)

business functions	protocols	sensor/controller types	activity	domains

business functions:
- Smart, connected workplace
- Business process monitoring, control, & optimization
- Enhance and extend IT
- Automation of products and services
- Business intelligence
- Engaging and connecting with customers & the marketplace

enterprise

protocols: cellular, Wifi, NFC, Bluetooth, Z-Wave, Zigbee, RFID, Smartdust, MEMS, TCP/IP, HAN

sensor/controller types: light, HVAC, magnetic, seismic, imaging, thermal, acoustic, chemical, humidity, location

activity: control, measurement

domains: medical, industrial, vehicle, retail, home, office, logistics

Different Application Verticals affected by IPv6 / M2M

Financial inclusion through ICT based application

Increased Productivity by remote monitoring

Remote Surveillance, Alarm panel relays

Lower energy bills with smart grid aware appliances

Reduced theft, accidents, Usage based insurance

Tracking and replenishment of Inventory

Reduced Road congestion via traffic data analysis

Proactive remedial services

Remote Patient monitoring

Increased agricultural productivity through sensors and ICT devices

BANKING INDUSTRIAL SECURITY & SURVEILLANCE ENERGY VENDING TELEMATICS TRANSPORTATION MEDICAL Agriculture CONSUMER

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India ICT Strategy

Information and technology impact and potential

Development Strategy
- Development decisions
- Objectives and directions
- Change orientation
- Priorities

Where is development going and why?

In support of development

Direction for development

Information Strategy
- Development based
- Demand oriented
- Application focused

What information is needed?

Infrastructure and services

Needs and priorities

Technology Strategy
- Activity based
- Supply oriented
- Technology focused

How can it delivered?

Digital India Initiatives
Smart Cities Initiatives

Telecom Infrastructure,
Bharatnet etc.

IPv6 , M2M, cloud etc.

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Digital India Initiatives

Digital India is an initiative by the Government of India to ensure that Government services are made available to citizens electronically by improving online infrastructure and by increasing Internet connectivity. It was launched on 1 July 2015 by Prime Minister Narendra Modi.

NINE PILLERS OF DIGITAL INDIA

- Broadband Highways
- E-Governance – Reforming government through Technology
- Electronics Manufacturing – Target NET ZERO Imports
- Universal Access to Mobile Connectivity
- E-Kranti Electronic delivery of services
- IT for Jobs
- Public Internet Access Programme
- Information for All
- Early Harvest Programmes

Nine Pillars of Digital India

● TARGETS | ● COST

1 Broadband Highways
Broadband in 2.5 lakh gram panchayats by Dec 2016; Virtual network operators and smart buildings in cities; National Information Infrastructure by March 2017
₹ 47,686 cr

2 Universal Mobile Access
Cover rest of 42,300 villages by FY18
₹ 16,000 cr

3 Public Internet Access Programme
Common Service Centres in 2.5 lakh villages by March 2017; 15 lakh post offices to offer multiple services
₹ 4750 cr

4 E-Governance: Reforming Govt through Technology
Simplify forms, create online repositories for school certificates, IDs Integration of services and platforms (Aadhaar, payment Gateway); automate govt workflow; redress grievances

5 E-Kranti - Electronic Delivery of Services
E-education, broadband, free WiFi, online courses. * E-healthcare, online consultation/records/supply. Full coverage in three years; online cash, load. Information for farmers, financial inclusion e-courts, e-police, e-prosecution

6 Information for All
Online hosting of information & documents; Govt engages via social media. Little addition resources needed

7 Electronics Manu-facturing – Target Net Zero Imports
Focus on semi-conductor fabrication plants, fabless design, set-top boxes, VSATs, mobiles, consumer & medical electronics, smart energy meters, smart cards, micro-ATMs

8 IT for Jobs
Train 1 crore people in towns/villages in five years (new); three lakh agents to run viable businesses delivering IT services (ongoing); five lakh rural IT workforce in 5 years; BPO in every NE state
₹ 200 cr

9 Early Harvest Programmes
Biometric attendance by Oct; WiFi in all varsities secure govt email hotspots in cities with pop > 1 million/tourist centres; ebooks; SMS-based distaster alerts weather info
₹ 900 cr

Smart City – Mission Statement of the Government of India
The Mission will cover 100 cities and its duration will be five years (FY2015-16 to FY2019- 20)


SMART CITIES MISSION STRATEGY

i. Pan-city initiative in which at least one Smart Solution is applied city-wide

ii. Develop areas step-by-step – three models of area-based development

- Retrofitting,
- Redevelopment,
- Greenfield

Core Infrastructure to be addressed

➢ Adequate water supply,

➢ Assured electricity supply,

➢ Sanitation, including solid waste management,

➢ Efficient urban mobility and public transport,

➢ Affordable housing, especially for the poor,

➢ Robust IT connectivity and digitalization,

➢ Good governance, especially e-Governance and citizen participation,

➢ Sustainable environment,

➢ Safety and security of citizens, particularly women, children and the elderly, and

➢ Health and education.

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Smart Cities Initiatives
(Best Use case of Information Highway)
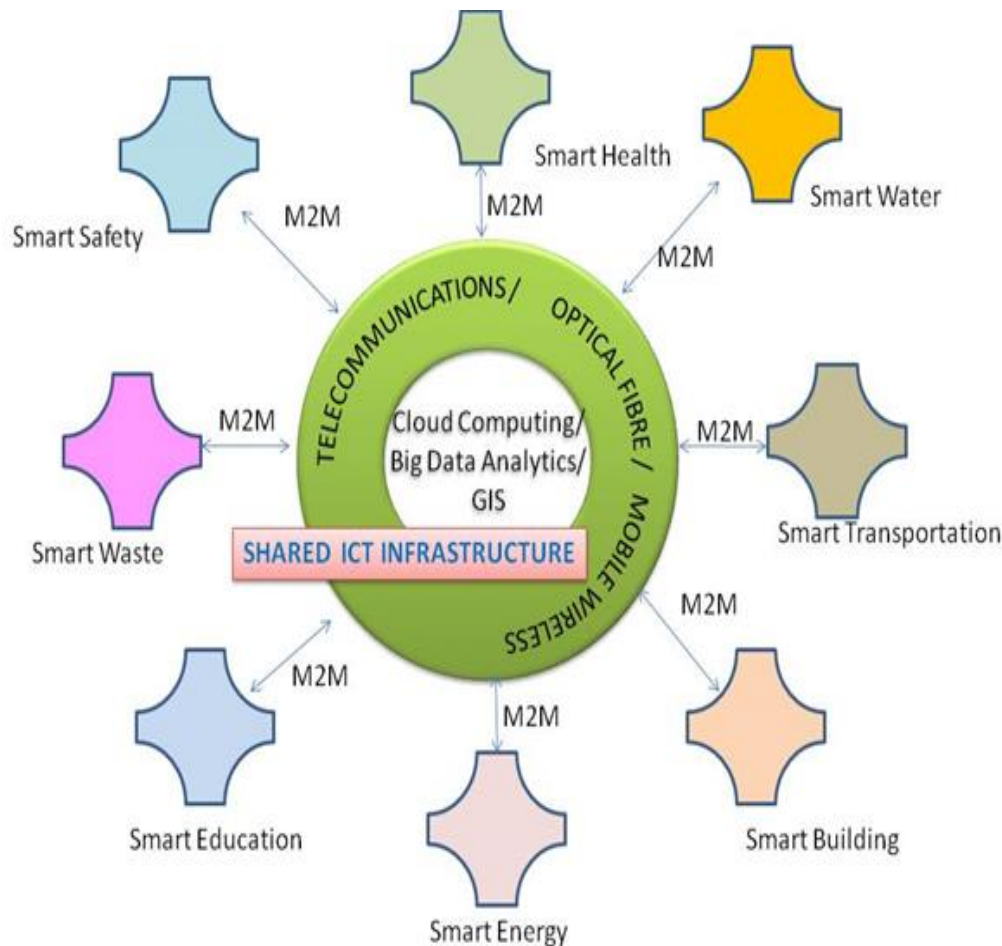
➢ Distinction between physical infrastructure and Digital infrastructure as separate, and disjoint entities requiring differential treatment in planning and execution is passe.

➢ e-infrastructure an inalienable part of physical infrastructure.

➢ Synergy requirement makes it imperative for Telecom sector to take into account various facets of physical world and M2M.

Information Highway with IPv6, M2M & Cloud will be the core of Smart Cities Infrastructure

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Challenges for the Future

1. **Policy Implementation**
   - ✓ Involving the private sector in a big way
   - ✓ Supporting regulatory framework

2. **Standardization / Interoperability**
   - ✓ With so many technologies, defining standards and making systems interoperate is a big challenge

3. **Security / Privacy Issues**
   - ✓ Data is no longer restricted to home or office.
   - ✓ Digital domain is borderless
   - ✓ Data can reside anywhere across the world – How to ensure the security & privacy of data in such a borderless world ?

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Conclusion

- ✓ The Information Highway of 2020 will have both fixed and mobile IPv6 networks at the backbone, M2M sensors as largest connected devices segment and cloud as the content and service delivery platform.

- ✓ With all these technological developments in place, and various applications to meet the needs of society, the I-way will form the backbone of our Smart Cities and Digital India initiatives.