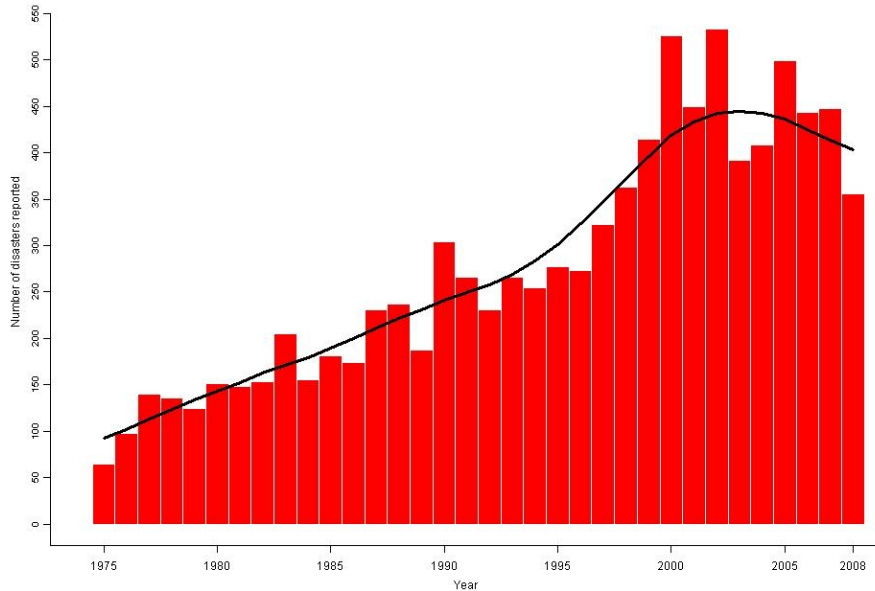


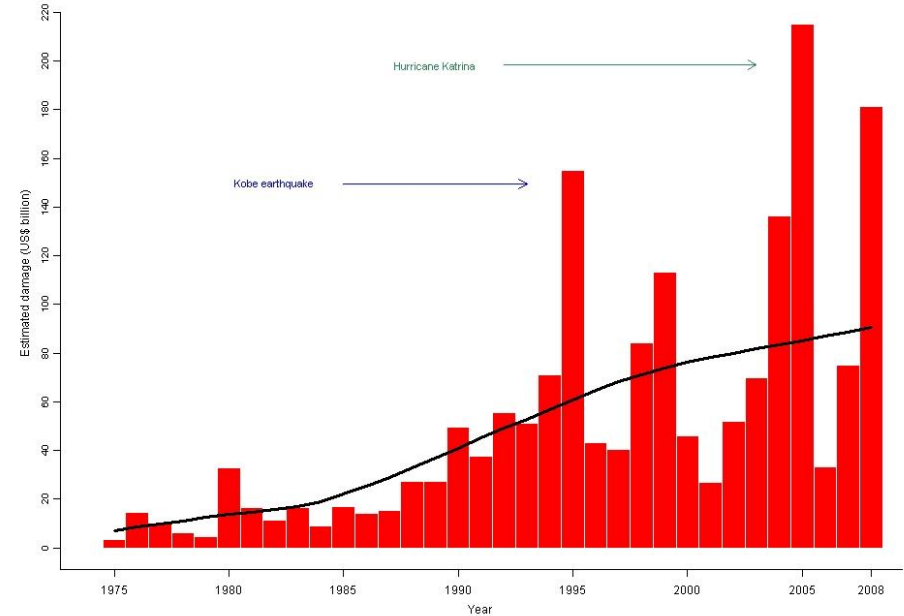
## IPv6 based Emergency Rural Healthcare

Natural disasters reported 1975 - 2008



EM-DAT: The OFDA/CRED International Disaster Database - www.emdat.be - Université Catholique de Louvain, Brussels - Belgium

Estimated damage (US\$ billion) caused by reported natural disasters 1975 - 2008

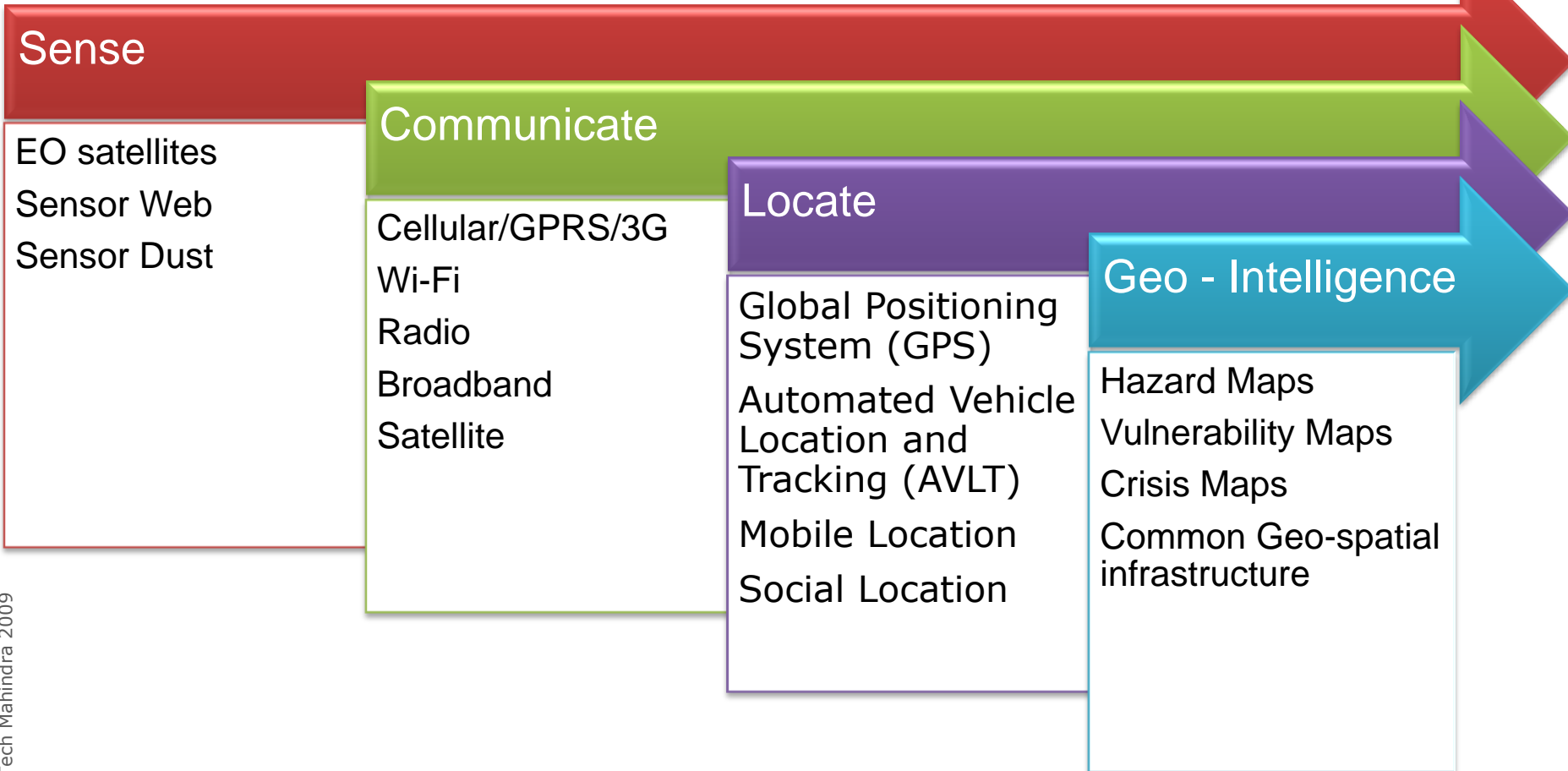


EM-DAT: The OFDA/CRED International Disaster Database - www.emdat.be - Université Catholique de Louvain, Brussels - Belgium

Source: CRED International Disaster Database, 2008

Note: Includes – Drought, earthquake, epidemic, extreme temperature, famine, flood, industrial accident, insect infestation, miscellaneous accident, slide, transport accident, volcano, wave/surge, Wildfire and windstorm

## Early Warning – Response - Recovery



IPv6 is not only for IT industry, but for all industrial segments

- by the improvement of RoI
- by applying the Internet technology

Integration of real-space and cyber-space

- Sensor Technologies
- IPv6 LoWPAN, Large Address space, Auto-configuration

Apply to public service/security infrastructure

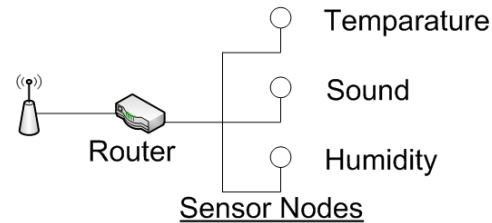
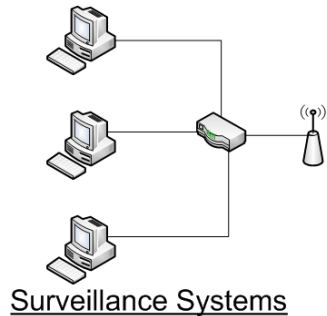
- End-to-End Security
- IPSec in-built

Integration with Media business

- Handling of large packets - Jumbograms
- Custom handling of traffic - Flow label

Deployment of peer2peer applications

- End-to-end sessions
- No need of NAT



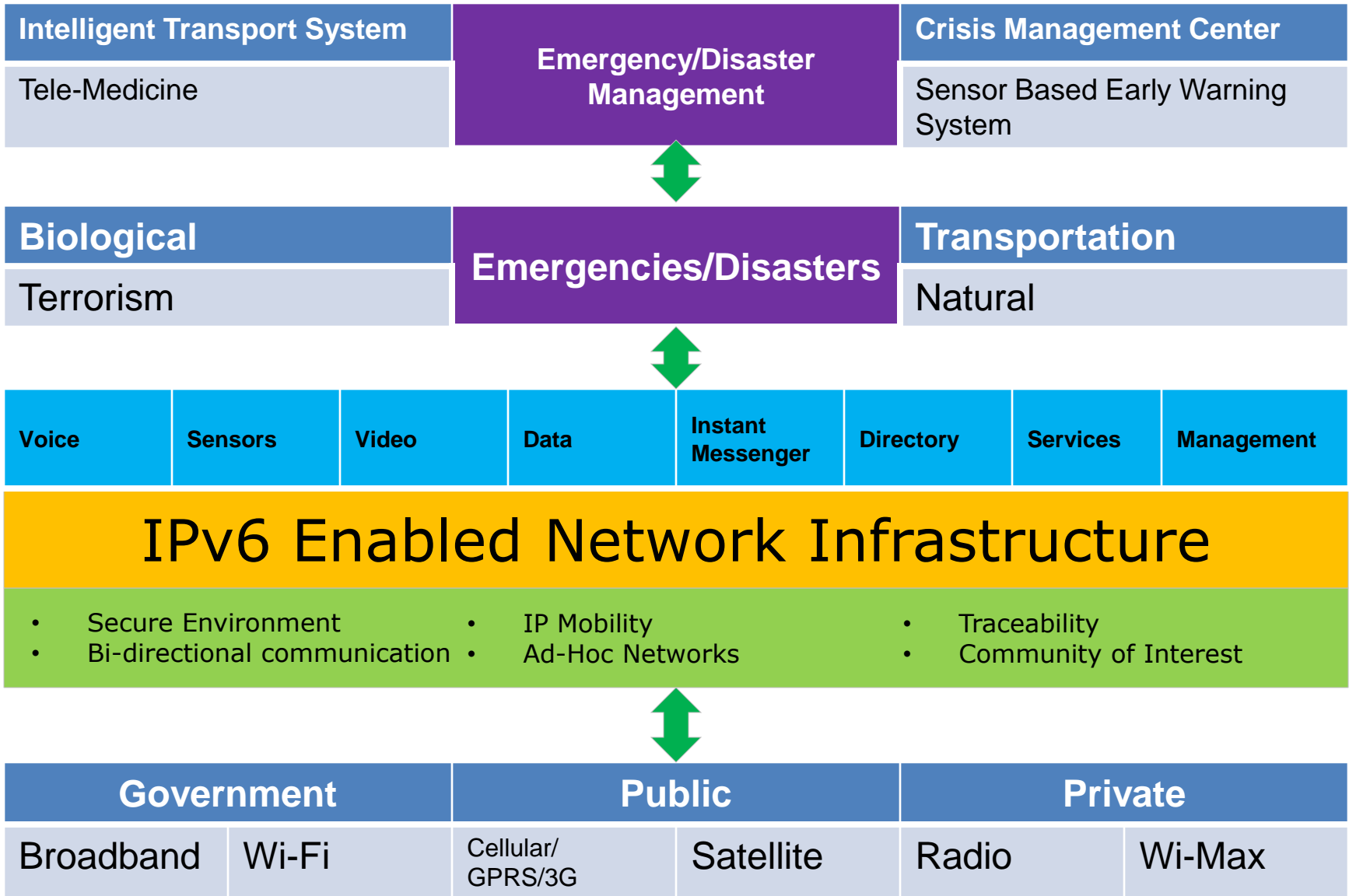
## Using IPv6 in sensor networks

- Increases Network Connectivity
- Helps build intelligent monitor and control system
- Increases the flexibility of sensor node interaction
- Self Organized System
- Low power system
- Highly Secure System

## Different Sensor Services

- Image
- Sound
- Radioactivity
- Humidity
- Luminosity
- Temperature
- Movement

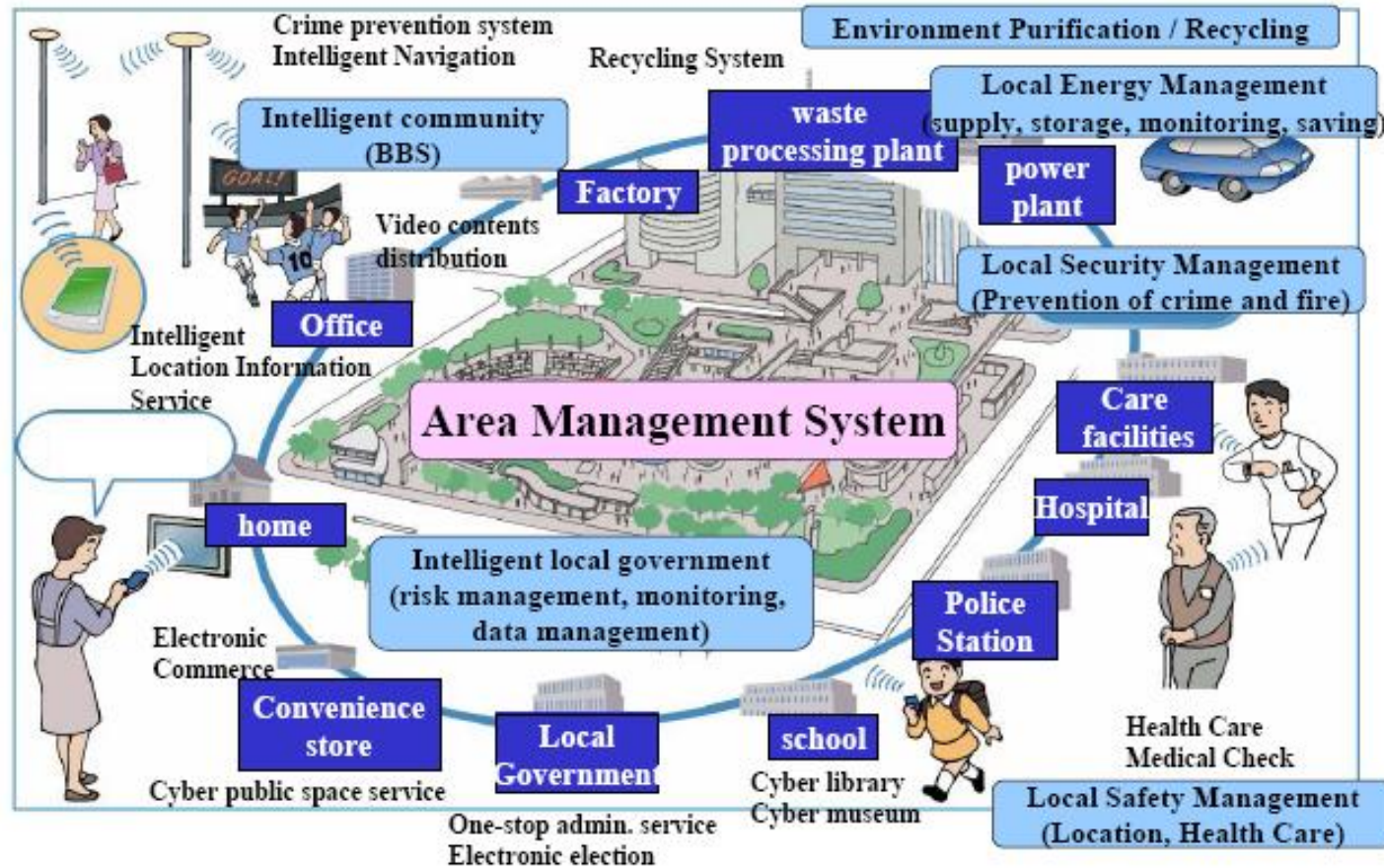
# Emergency/Disaster Management



# IPv6 Emergency/Disaster Management System - Metropolitan Design – Real Space Internet with IPv6



Source: Matsushita Electric Works



Sensor Based – Early Warning System	Tele-Medicine
Intelligent Buildings	Integrated Communication Network
Intelligent Transport	Next Gen – Crisis Management Center

# IPv6 and Rural Emergency Healthcare

## Background

- Geography: Majority of the areas are remotely located from cities and towns
- Poor medical resources in rural areas
- Lack of Hospitals in Rural areas
- Lack of doctors in Hospitals in Rural areas
- Medical help in case of Emergencies reaches very late

## National Rural Health Mission (NRHM)

- Seeks to provide effective health care to the entire rural population in the country with special focus on 18 states which have weak public health indicators.
- Strengthen Rural hospital for effective curative care
- Seeks to improve access of rural people, especially poor women and children, to equitable, affordable, accountable and effective primary healthcare

## Rural Emergency Healthcare – one of the key components to make NRHM Succeed



- EMRI is a pioneer in Emergency Management Services operates under Public Private Partnership mode with **Mahindra Satyam as Technological partner.**
- EMRI is the only professional Emergency Service Provider in India today.
- EMRI provides free service delivered through state-of-the-art emergency call response centers and has over 2056 ambulances across Andhra Pradesh, Gujarat, Uttarakhand, Goa, Chennai, Rajasthan, Karnataka, Assam, Meghalaya and Madhya Pradesh.



## Vision 2010

- To provide Free emergency response services for Medical, Police and Fire emergencies across India by 2011 in PPP (Public Private Partnership) framework**
- To respond to 30 million emergencies and save 1 million lives annually by 2011**
- To deliver services at global standards through Leadership, Innovation, Research & Training and Technology**
- To be recognized as best-in-class and become 1 of 8 wonders of the World**

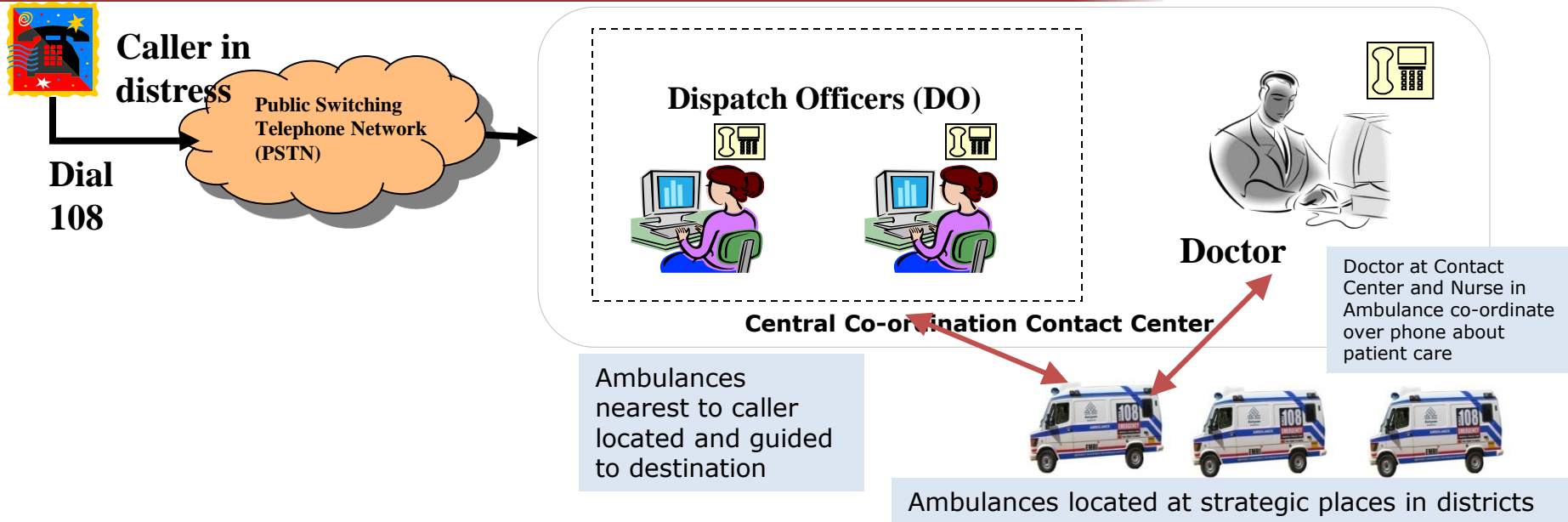
### AWARDS

EMRI has bagged the NASSCOM-CNBC TV 18 IT User Award- 2008 for using technology for saving lives.

EMRI bagged the first prize in the health care category at the Computer World Honors Laureate award -2008

2007 MICROSOFT® PARTNER OF THE YEAR AWARDS - CITIZENSHIP PARTNER OF THE YEAR WINNER  
SATYAM COMPUTER SERVICES LTD., INDIA

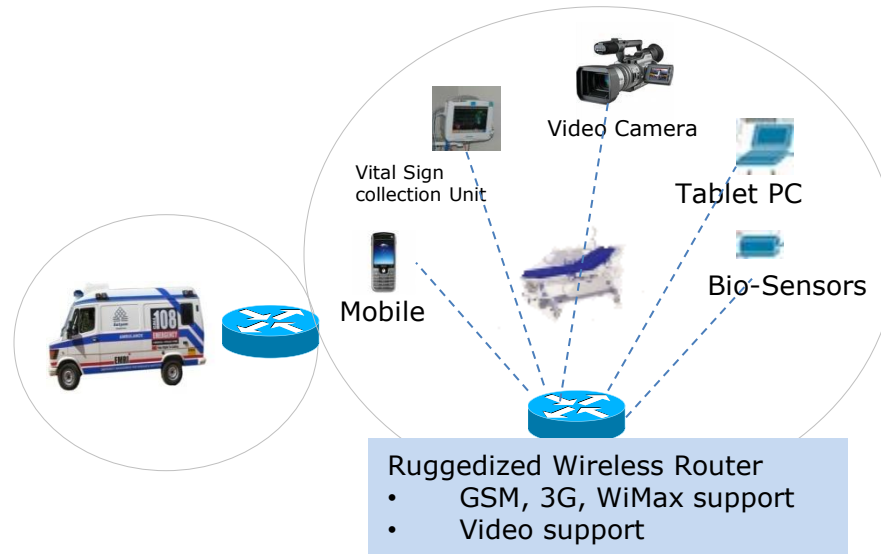
The Citizenship Partner of the Year Award recognizes the exceptional partner that has made a sustained commitment to society and its communities and can demonstrate the impact of its work.



## Challenges in Today's – Rural Emergency Healthcare scenario

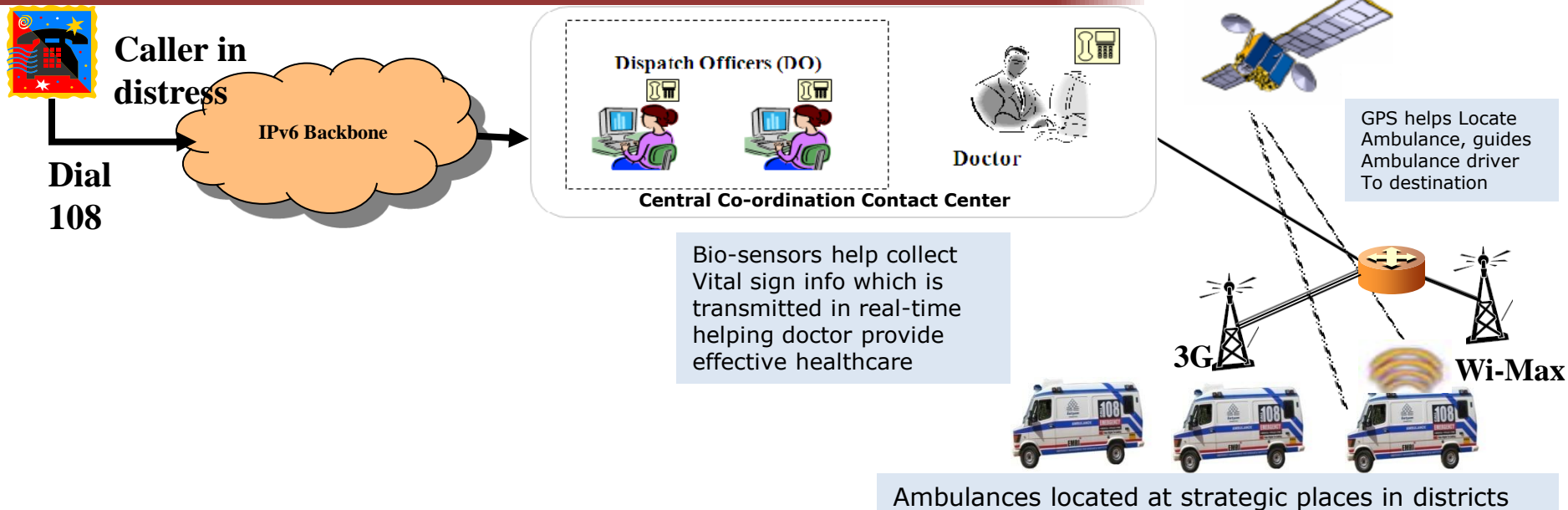
- Patient Vital sign information provided offline by phone – Blood pressure, ECG, Temperature .. Etc.
- Patient condition and scenario explained over the phone – Doctor lacks the ability to see the patient's visual condition
- Doctor provides Offline Healthcare – Based on Vital sign info conveyed over phone
- Effective Emergency Healthcare hampered by lack of continuous vital sign info.
- Dispatch officer locates nearest Ambulance to caller – manually by calling Ambulances
- Dispatch Officer manually guides Ambulance over the phone to the destination

# IPv6 communication Equipment – Enabling Next-Gen Rural Healthcare



Network Equipment	Details
Ruggedized – Emergency router	Router with redundant communication capabilities across GSM, CDMA, 3G, WiMax ...etc
Cellular Diversity Antenna	An antenna, tor diverse communication technologies, spanning, 3G, Wi-Max, CDMA ...etc
IPv6 Bio-sensors	IPv6 based Bio-sensors which help in collecting information about vital signs
Medical Vital sign tracking Unit	Medical vital signs collection unit
Video Conf system	IPv6 based Video conf system, which will help I patient monitoring and treatment
Video encoder/Decoder Cards	Video Cards that would fit in the Emergency router
Tablet PC for Information Gathering and transmission	Emergency information gathering and collation unit
Multi-Frequency Mobile Phones	Mobile phones, which take care of the diverse communication technologies,
GPS Tracking system	Location and tracking of the ambulances

# IPv6 Enabled Rural Emergency Healthcare



## IPv6 Technologies – Rural Emergency Healthcare

- Bio-Sensors
- IPv6 based Real-time Vital signs data transfer
- Seamless Video-Conference

- VoIP enabled Telephony
- Automatic Vehicular Location System
- Real time Inventory Asset and Inventory tracking using IPv6

## Benefits – IPv6 Rural Emergency Healthcare scenario

- ✓ Patient Vital sign information collected on a continuous basis by Bio Sensors– Blood pressure, ECG, Temperature .. Etc,
- ✓ Patient's condition is seen in real time Video by Doctor – Providing effective healthcare to patient
- ✓ Doctor provides Effective Emergency Healthcare, based on Real-time Vital sign info
- ✓ Dispatch officer locates nearest Ambulance to caller – by using GPS
- ✓ Ambulance driver reaches destination faster via automatic guidance using GPS

**IPv6 simplifies and enhances Rural Emergency Healthcare**

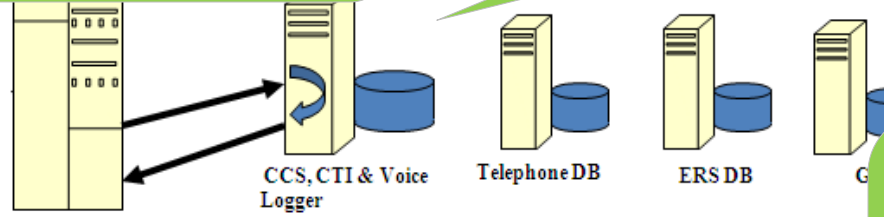
# EMRI - Vision – IPv6

- CTI
- VoIP
- Voice Calls
- Fax
- SMS
- Email
- Chat
- Sensor based switches
- Hot Lines

108 Call  
**Sense**

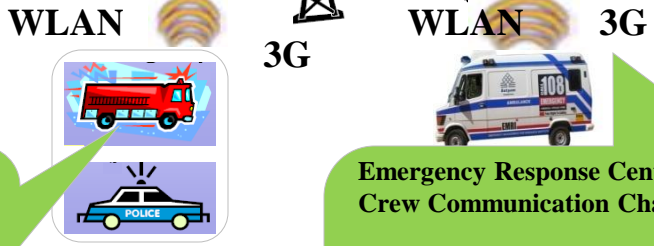
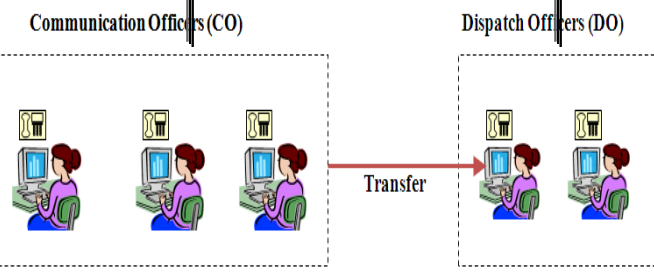
**Caller Location Identification**  
Location Based Sensing with Geocoded information of Buildings, Landmarks, Fixed Lines, and by Triangulation for calls originating from Mobiles

**Emergency Response Centre**  
Remote Site Operations with seamless fully automatic BCP



**Fleet and Inventory Management**  
Automation using RFID, Barcode Readers, AVL, PC in Ambulance, Vehicle Telematics, Tripsheets, Dynamic location of Ambulances based on the incidents history, Traffic Sensors

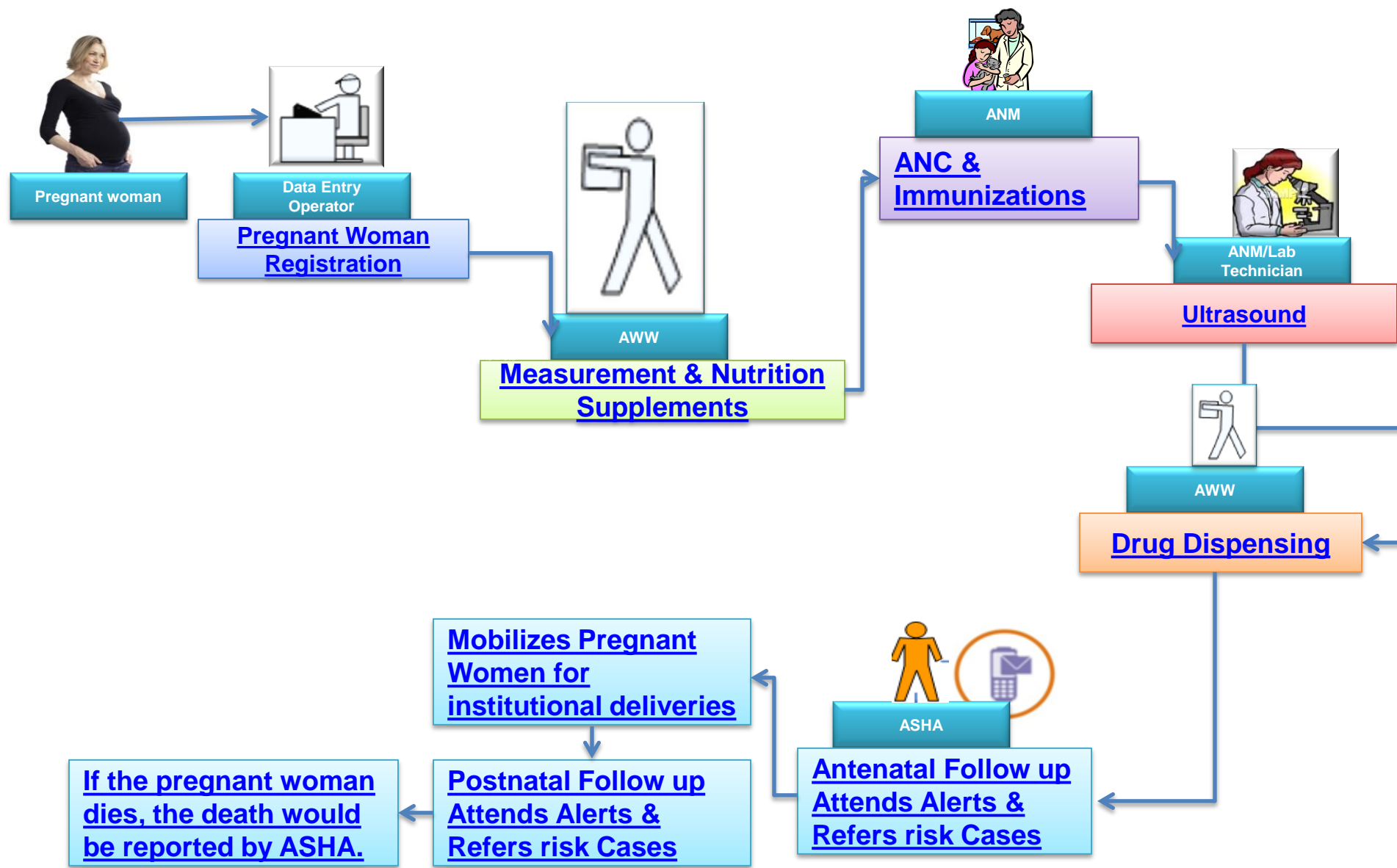
IPv6 backbone Network, Internet  
**Reach**



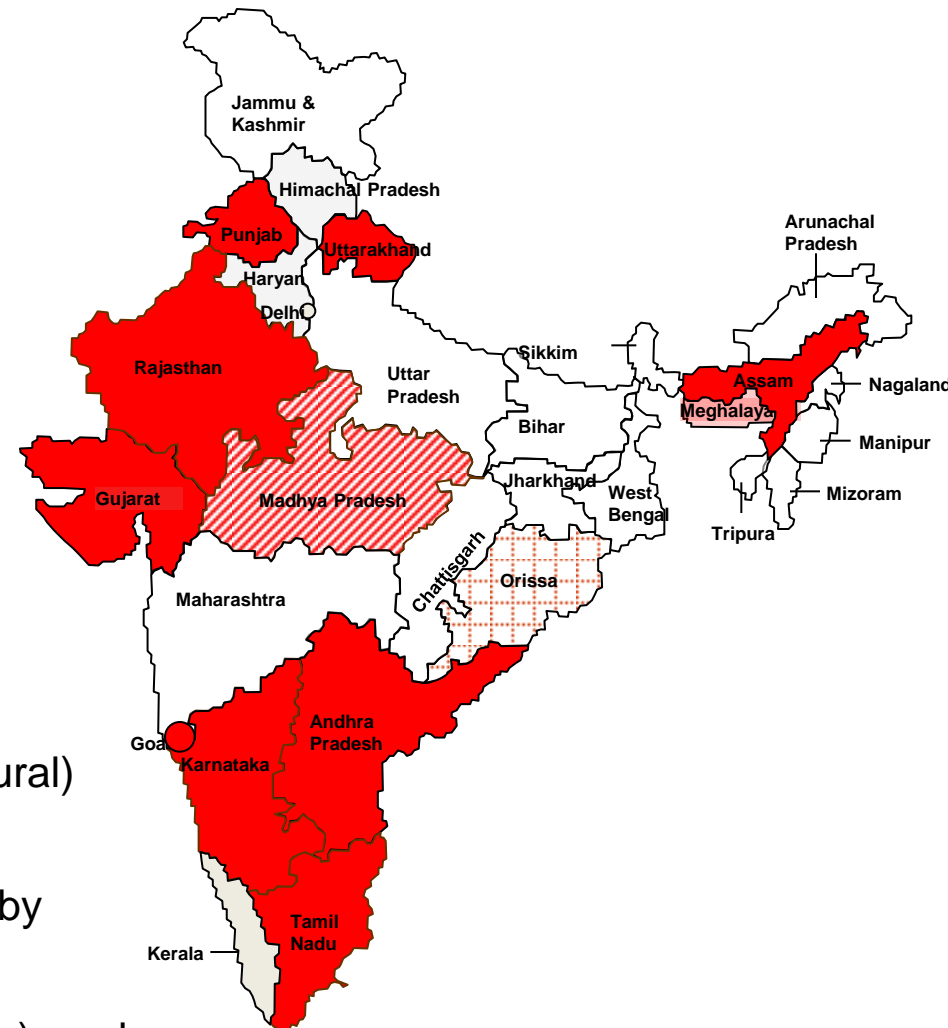
**Emergency Response Centre – Field Crew Communication Channels**  
CTI, VoIP, Voice Calls, Fax, Two way SMS, email, Hot Lines, any combination of origin and destination with PSTN, GSM, CDMA, 3G and Radio

**Emergency Response Centre – Other Agencies Communication Channels**  
any combination of origin and destination with PSTN, GSM, CDMA, 3G and Radio

**Care**  
**ERC**  
Telemedicine  
Online streaming of Vitals, Video, Medical Images to Emergency Response Centre, Online Hospital Networks, Bio-Sensors



- 12,000 + EMRI Associates
- 6,800 + Private Hospitals / Nursing homes
- 2,000 Police / Fire Stations
- 280 M population covered in 11 States
  - 100+ Lakh calls received till date
  - 500,000 emergencies handled
  - 6,500 emergencies in a day ( 2.4 Million annualized)
  - 1,900+ Ambulances - 6+ trips a day
  - < 3 minutes Ambulances assigned
  - < 14 minutes (urban) and < 21 minutes (rural) Ambulances reached
  - 100% virtual handholding (in ambulance) by EMTs and physicians
- 100+ lives are saved each day (46,000+ till now) and 6,370 victims receive timely, high-quality pre-hospital care



# Acknowledgements

Thanks to Hemanth Dattatreya, IPv6 Forum India, President, for all the encouragement and support

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Thanks to Ganesan Sekar – Senior Vice President – Mahindra Satyam – For the absolute support and encouragement – without which things would not have happened

- MetroNet6 – <http://www.apan.net/meetings/xian2007/presentations/ipv6/metronet-6.ppt>
- U2010 – <http://www.eu-orchestra.org/docs/ISTworkshop/U2010%20-%20Latif%20Ladid%20-%20IPv6%20Forum.pdf>
- IPv6: Experience in the Transportation Sector – <http://gstproject.org>
- A telemedicine system on the broad band network and some aspects of throughput in the IPv4 and IPv6 network environments - [http://k-inet.ee.t.kanazawa-u.ac.jp/~yamada/yamada\\_lab/janzs2004/paper/ppt/no50.ppt](http://k-inet.ee.t.kanazawa-u.ac.jp/~yamada/yamada_lab/janzs2004/paper/ppt/no50.ppt)
- IPv6 Deployment Status in Japan -Exploring New Business Area - [http://ipv6.eu/admin/bildbank/uploads/Documents/Vienna\\_June\\_2006/Keynote\\_1\\_Hiroshi\\_Esaki\\_-\\_UTokyo.pdf](http://ipv6.eu/admin/bildbank/uploads/Documents/Vienna_June_2006/Keynote_1_Hiroshi_Esaki_-_UTokyo.pdf)

