INDIA
Reinventing itself in Communications Sector
Technology & R&D perspective

A professional point of view by
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India’s Premier National R&D Centre for Telecom Solutions
Telecom Sector Background Information

(All figures indicative only)

- Total Urban Population approx 27%
- Urban Towns >5100 (Less than 100 k Population)
- Total Villages > 550 k (Less than 5k population)
- Subscribers over 100 Million, Teledensity > 9.5 %, 35 % (2010)
- Wireless Subscribers already more than fixed line subscribers (about: 54%, 46%)
- Broadband projections 3 million (2005), 9 million (2007), 20 million (2010); Internet Connections double of these
- Internet users > 16 million
- Cable TV connections > 60 million (Approx.)
- 14.5 million Rural Connections
Related Scenario

- Sharply declining tariffs, Competition amongst public private service providers
- Falling ARPUs
- Favourable Government policies
- Independent regulator, dispute settlement agency
- Open playing field to multiple players in various segments of the network and services
- Unified licensing regime
- Established USO fund
- Comprehensive Broadband Policy Announced
- Comprehensive review of spectrum, policy, pricing
- Progressive FDI policy. Simultaneously, Government considering ways and means to boost indigenous R&D and manufacture
Role Players In Changing Telecom Scenario

• Users
  – With Service Wish List (Mainly Urban)
  – With Social Needs (Mainly Rural)
• Content & Application Developers
• Network Operators & Service Providers
• Infrastructure Providers
• Governments & Administrations for
  – Policy
  – Social Role
  – Standards
  – Regulation
  – Spectrum & Resource Provisioning
  – Dispute Settlement
Drivers for ICT R&D in India

- Push for Self reliance
- Tremendous growth potential in tele-density, broadband
- Availability of highly professional and skilled manpower
- Specific need in the country
  - Variable Requirements
  - Vastly varying environment
  - To improve connectivity in rural & remote areas
    - Telephone
    - Mobility
    - Broadband
ICT Investment Growth Rates in India
(According to one of the estimates)

- BPO sector growth rate is 40%
- Services sector growth rate is 34%
- Enabled Services growth rate is 60%
- Product R&D growth rate is 40%
Now Ubiquitous Services
Multimedia
Changing Services Scenario
Always ON
Converged Services
Mainly Dial up
Voice
Technology Dependent
Ubiquitous Services
Global Services
Changing Services Scenario
Seamless Mobile
Now
Interplay of Drivers in Telecom Growth

- Infrastructure for Access
  - Requiring Quality Infrastructure
  - Promoting Proliferation of Access Devices

- Reinforcing Growth Cycle
  - Promoting Content

- Content
  - Access Device

The diagram illustrates the interplay of key drivers in the growth of the telecom industry, emphasizing the feedback loop between infrastructure, content, and access devices.
Other Network Elements and Features

FUTURE PROOF OPEN PLATFORM FOR CONVERGED SERVICES

• Enhanced Mobility and Terminals
• Broadband Access
• High Bandwidth Optical Transport
• Fibre Feeding last Mile Wireless Access
• Multi-Access, Multi-Service Protocols - MPLS
• Advanced Network Intelligence and Management
• Multi-mode, Multi-band, Multi-Functional Wireless Devices
• WLAN Hotspots in Public and Semi-Public Locations
• Different QoS and Bandwidths
• Configurable Software Defined Radio
Technologies for next generation

*Openness to All Types of End-users, Services and Applications 24*7 Requirement, Location, Service Software and Hardware.*

- Growing Productivity of Microprocessors
- Powerful Digital Signal Processors & Engines
- Optical Communication System
- Effective Methods of Digital Compression and Transportation of Information
- Powerful Software Applications Technologies
Broadband Technologies

- All technologies and media relevant in Indian Context
- Many fold cable TV connections than Internet indicate Entertainment driven Broadband Scenario
- Cable TV Network also being refurbishing - triple play
- Low teledensity --- limited volume of copper loop DSL
- Optical fibre interconnecting switches and back haul
- Wireless a strong contender for roll out of Broadband
- Wi-max backhaul a possibility in remote & rural areas
- Satellite for inaccessible areas
- VSAT operators foresee a good role
- 2.4 Ghz delicensing , 5 Ghz strong Contender, 3.5 ??
- Rural Broadband Kiosks, Community Telecentres
- Local, regional language Content major component for value addition
Wireless Technology Scene

- Some predict 100 million mobile subscribers till 2006
- Expected wireless penetration (2008) > 14%
- 3 major operators share 60% of mobile subs
- Latest monthly additions show 76% & 24% share of GSM & CDMA respectively
- 3.0 million FWT terminals, Growth 8.7%
- Wireless Kiosks - temporary events, shows, sales
- Wireless e-governance, banking — limited by secy issues
- Limited mobility based on CDMA, CDMA-1x, in use
- WiFi hot spots. WiMax for access and backhaul
- Spectrum issues under consideration
- Wireless to play significant role also to achieve rural teledensity of 6-8% by 2010
- GPRS, EDGE being strongly contemplated by operators
- Discussion for IMT 3G services & spectrum requirements
MOBILE NETWORKING STRUCTURE

Service Platform
- Future Proof
- Proactive & invisible
- Secure and Reliable

Network
- Reliable All-IP
- Variety of Access methods
- Re-configurable

Terminals
- All-in-one type
- Ubiquitous-chip type

Intelligent Pipe

Intelligence Sharing

Ubiquitous Connectivity
Spectrum Management

Frequency Bands used by Applications may need lesser Spectrum than Originally Planned due to Technology Improvements and Dynamic Provisioning

- Extensive Use of Spectrum Management Tools
- Spectrum Re-Farming
  - Optimize Spectrum Use
  - Accommodate Demands of New Frequency Bands for
    - New Technologies
    - Growth of Subscribers and Services
The Intelligent Services Layer of the Networks

Service Plane = Service and Application Layers

- Service Control Logic out of switching/routing systems
- Service nodes used as shared resources

Transport Layer of Telecommunication Network

Transparency of Layers to make Design and Deployment of New Services Almost Instantaneous
Continued Need of Regulation, Standards

• To Effectively Address Technological Challenges & Innovation
• Interconnectivity and Interoperability
• Appropriate Migration Scenarios
• Higher Performance and Lower Costs
• Intellectual Property Rights, Security and Privacy, Legal & Political Aspects, Fair Competition
Network Security Important due to Traffic Growth

Technology Solutions For

- New Security Threats to Grow Further due to Greater Connectivity
- Increasing Amount of Traffic and User Services
- Failures of Networks with different Operational Speed, Complexity, Topologies, grades of availability
Rural Communication

Factors, Those may Still be Valid in Some Rural Areas. However, the Number of Such Areas will Reduce Progressively

- Fewer Access Points
- Lower Speed and Volume of Data
- Acceptance of One Order Lower QOS
- Limited and Sparse Service Areas
- Variable Environmental Conditions
- Economically not profitable
- Power Supply Problem in some Places & Topologies
- Zero Maintenance Systems, Preferably
Rural Communication Services

• Apart for other City Type of Services, Special Focus on
  • Tele-Education, Tele-Health, e-Governance, Disaster Control Systems, Environmental Monitoring Systems, Multipurpose Community Tele-Centres, Local Governance, Issues of National Perspective, Internet Technologies

• Normally Urban Technologies may be Used
• Some Needs of the Community in Rural and Under-Provided Areas to be Addressed Differently than Those Provided in Urban Areas
Operators’ Challenges for Rural Areas – Subscriber Segments

LOW ARPU

ARPU

Business Subscriber  High-ARPU Subscriber  Low-ARPU Subscriber

*ARPU: average revenue per user
Operators’ Challenges for Rural Areas – Infrastructure Costs

- Especially in areas where missing public infrastructure costs are significantly higher than equipment costs.
Rollout of the Rural Networks – The Key Parameters

- Low population density
- Low ARPU subscriber
- High infrastructure costs
- Expensive operation
Proposed building blocks for Rural Wireless network - Individual & Kiosks with Service differentiation

- Long-range Base Stations
- Asynchronous Delivery Method
- Latency Tolerance
- GSM/CDMA - WLL
- Distributed Terminal Concept
- Innovative Infrastructure
- Switching with GSM Media Gateways or IP back
Strengths required by Indian R&D organizations

- Pool of Highly Skilled Young Engineers
- Proven Design Methodologies
- State-of-the-art Design & Testing Tools Pilot Production Facility
- Hardware and Software Infrastructure support to Mass Manufacturing Base
- Proven Technology Transfer Methodology
- Installation and Long Term Customer Support Technologies & Products - Appropriate and relevant to needs & requirements of the country
- Ability to provide full range of Total Telecom Solutions
R&D Partnership Models in ICT

- Short term and long term partnerships with Industry, Service Providers, users and research & development Organizations
- Direct Turnkey Solutions
- Joint Ventures
- Co-Branding
- Collaborative R&D
- Transfer of Technology
- Application Service Provisioning
- Joint bids against tenders
- Front-end marketing relationships
- Sponsored development for specific requirements
- Consultancy for future proof Network, Solutions and value added services
Some Examples of Indian ICT R&D Centres

- Tata Consultancy Services (TCS), Mumbai
- Wipro, Bangalore
- Infosys, Bangalore
- Other groups of Telcos, Industry and Service Providers
- C-DOT, Delhi
- CDAC, Pune
- CRL, Bangalore
- TIFR, Mumbai
- Media Lab Asia
- Institutions at Many Software Technology Parks
- IISC, Bangalore
- IIT, Delhi
- IIT, Mumbai
- IIT, Kanpur
- IIT, Kharagpur
- IIT, Chennai
- IIT, Gwahati
- IIT, Roorkee
- Cor-DECT Team
Some examples of ICT R&D investors in India

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C-DOT’s Current Setup & Projects

- Present staff strength of about 1100, comprising mainly of telecom Professionals
- Operating mainly from Delhi and Bangalore
- Presently working on
  - Next Generation Voice over IP Networks
  - Operation Support & Management Systems
  - Rural wireless and broadband systems
  - Advanced Intelligent Networks
  - Optical & Backbone Satellite systems
  - Solutions for Security, Strategic & Rural Network
  - Innovative Value Added Services
  - Fourth Generation System
CDOT’s New Focus

- Strategic partnerships of various modals to reduce time to develop, time to market and time to revenue
- Innovative technology based, cost effective, socio-economic solutions semi urban, rural and remote networks also leveraging existing networks (Rural Wireless & Broadband System)
- Cost effective, appropriate technologies & solutions for India Specific & Global markets (NMS, OSS, AIN, VOIP, DWDM, Broadband Solutions)
- Solutions for strategic sectors like defense and security
- Futuristic technologies- (4G Wireless, fixed-mobile Convergence, Optical switches)
THANKYOU

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