Research Agenda for Next Generation Broadband Wireless Access in India

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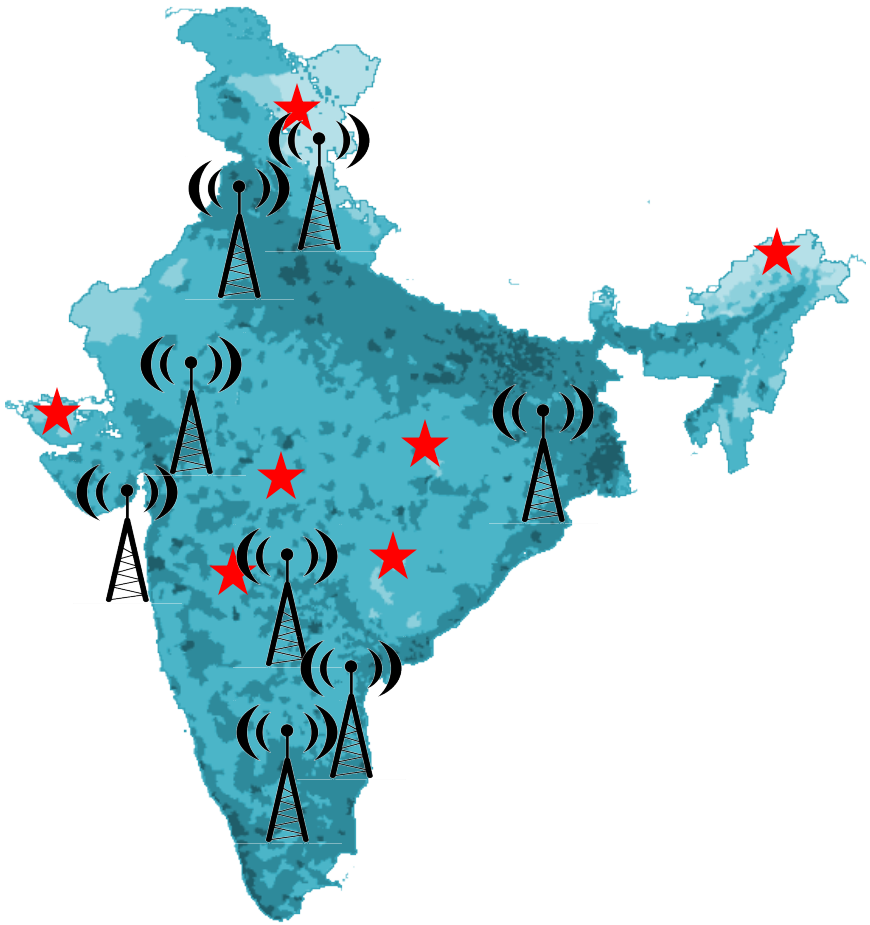
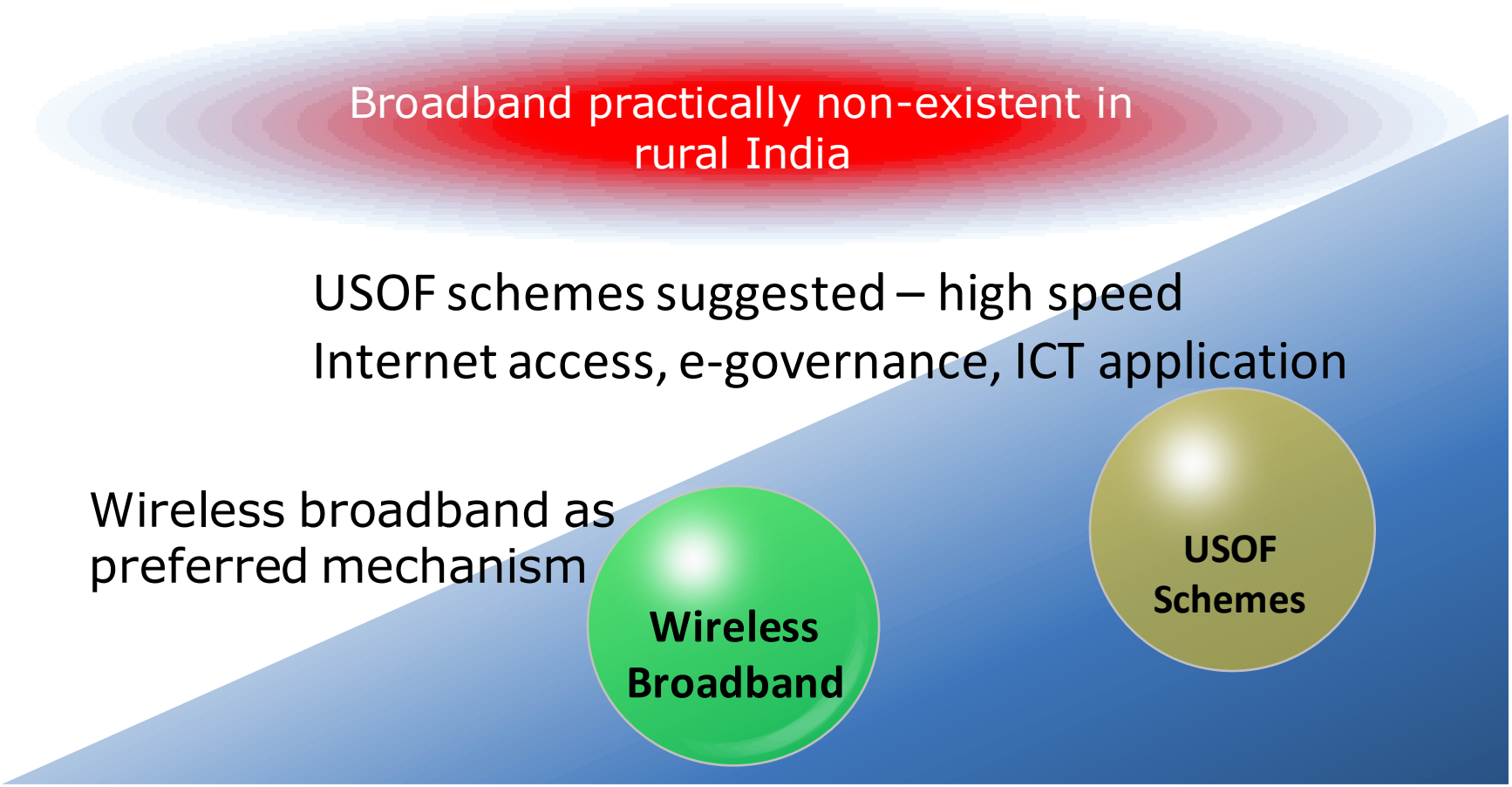
Digital Divide



Population Density Map
(source: www.reliefweb.int)

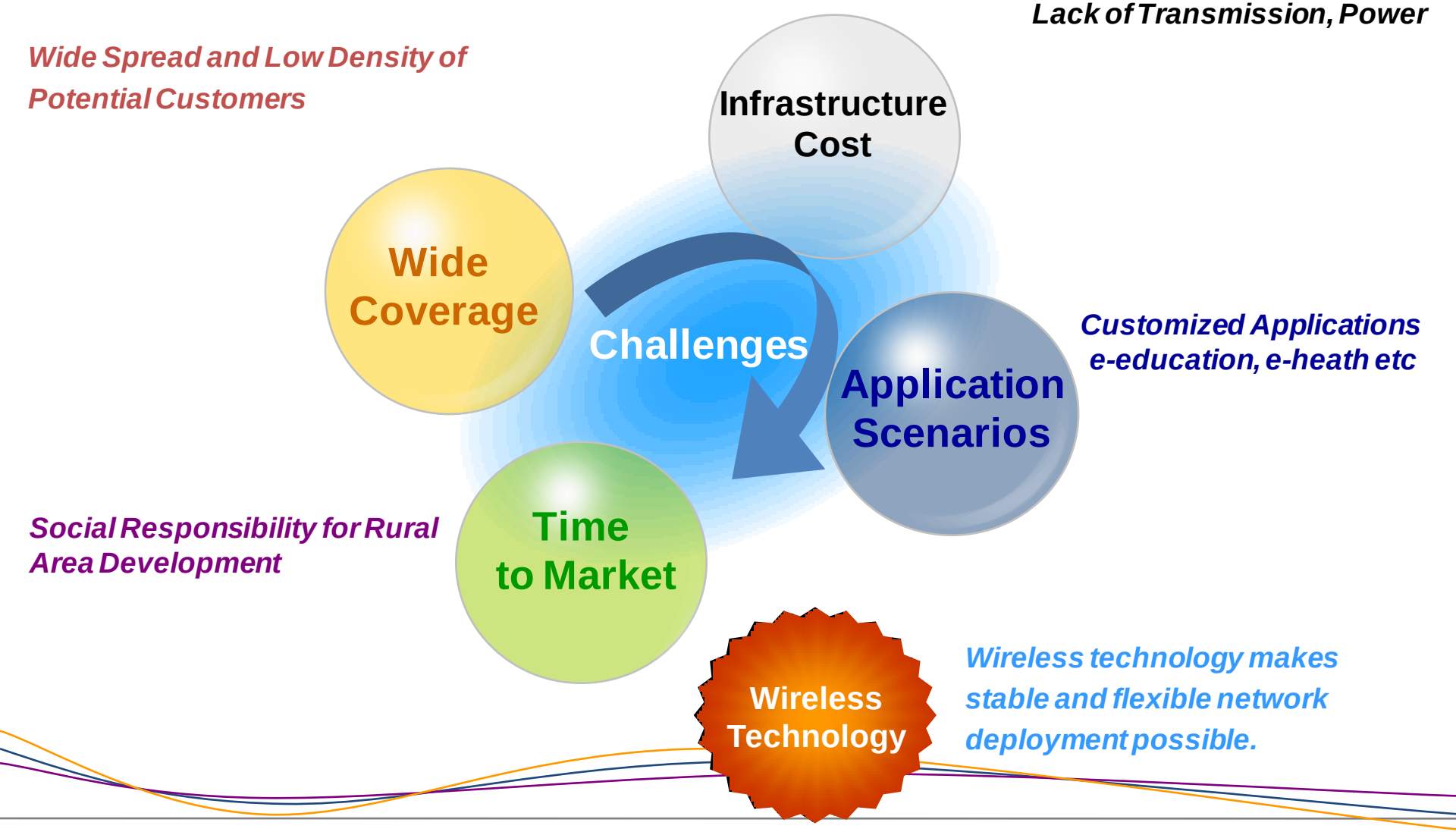
- 600 Million Cellphone subscribers
  - Only 30% subscribers from rural India
- Low Geographical Coverage
  - Only 60% of India
  - 25% of villages covered
- Very Low Broadband penetration

TRAI Recommendation: An approach to rural telephony (March2009)

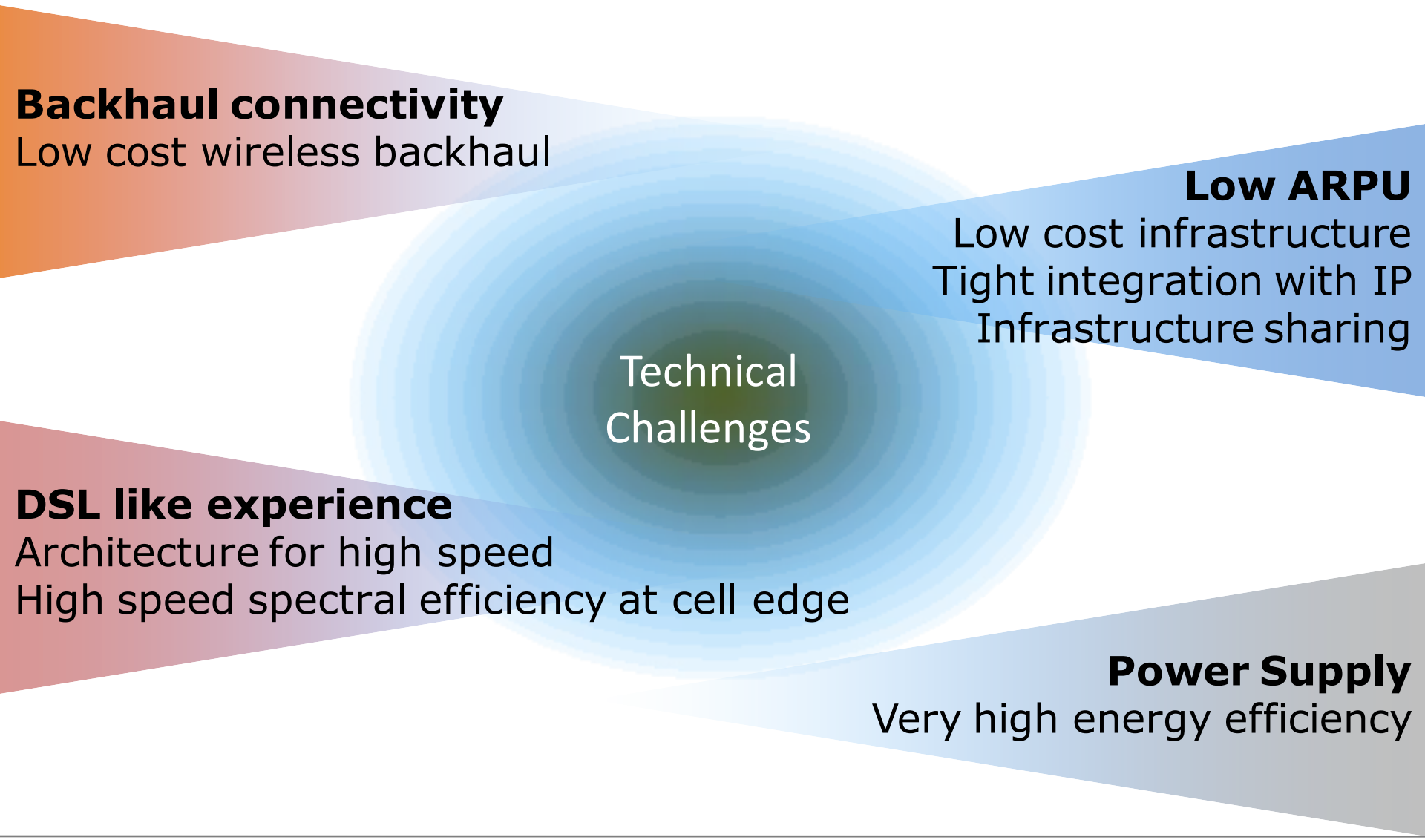


Suggested Measures for accelerated growth

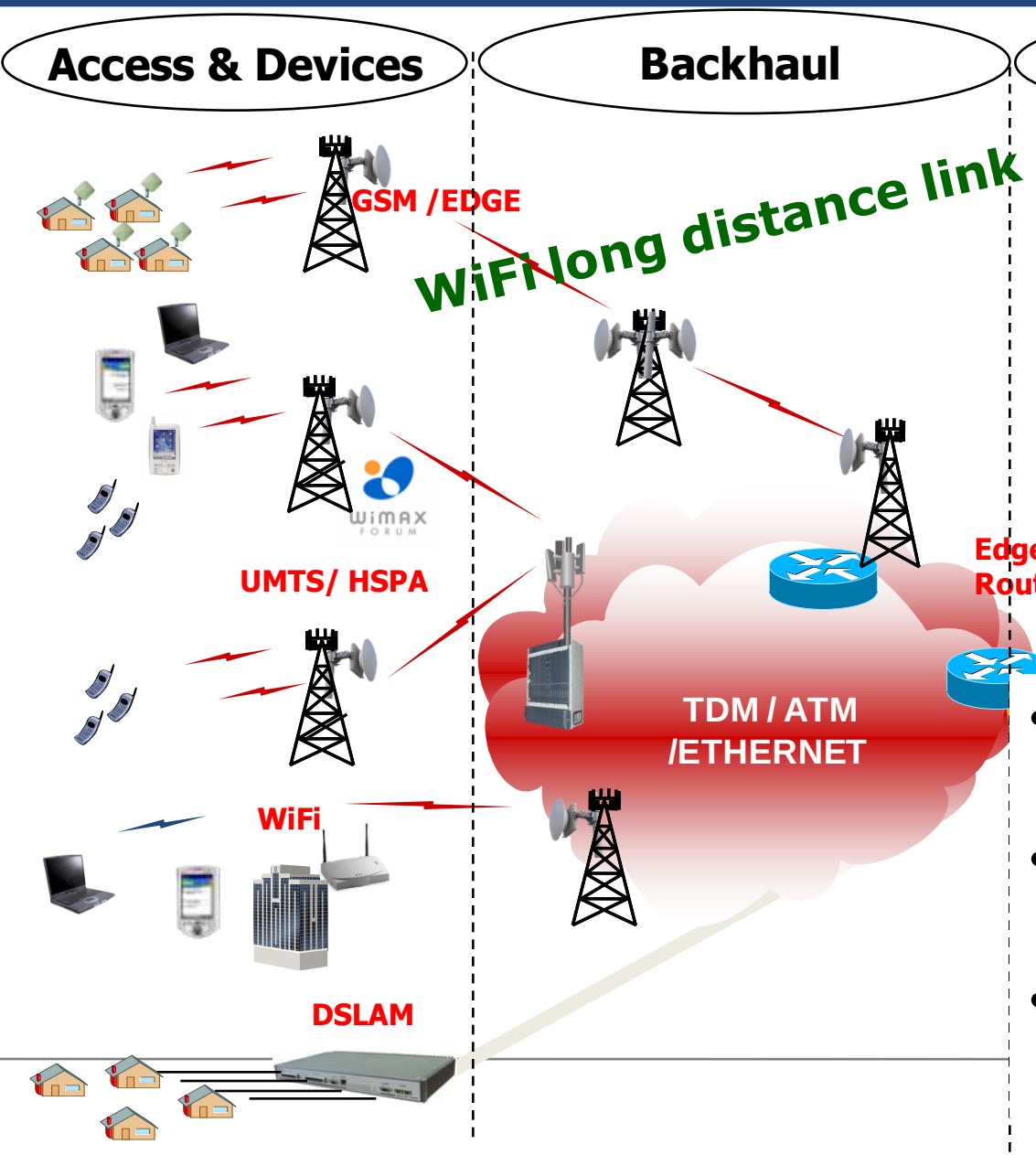
Challenges to Bridge Digital Divide



Technical Challenges: Driving Research Agenda



Backhaul



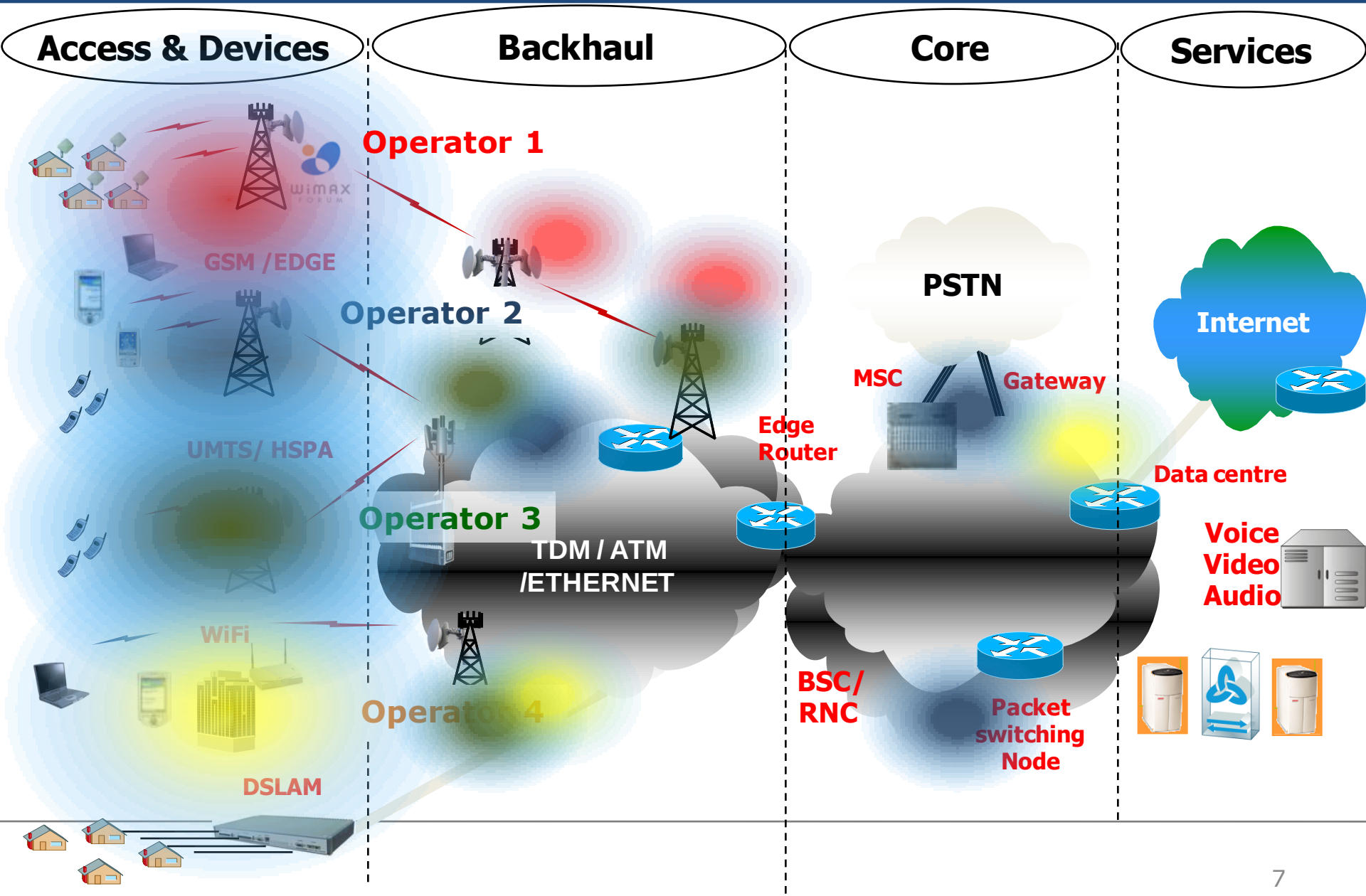
Benefits

- Inexpensive radio (<$50)
- Low power (<10 W)
- License free band
- But designed for Indoor

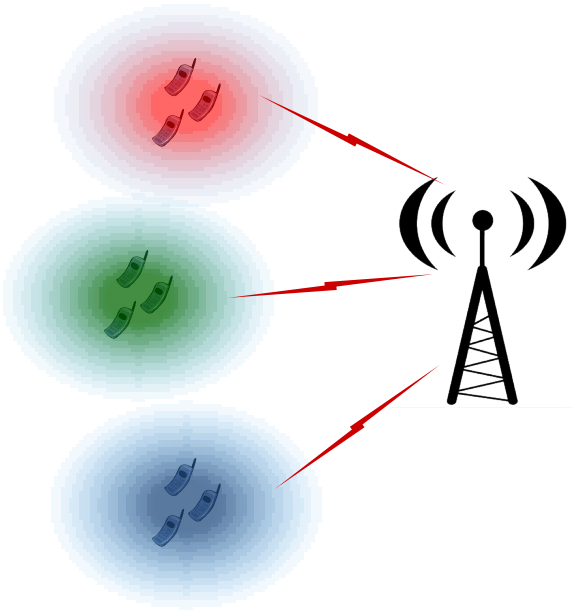
Technical Innovation

- Optimized MAC for outdoor point to point link
- Interference management for multi-hop link
- E1 circuit emulation for Legacy access GSM/CDMA)

Multi Operator Network

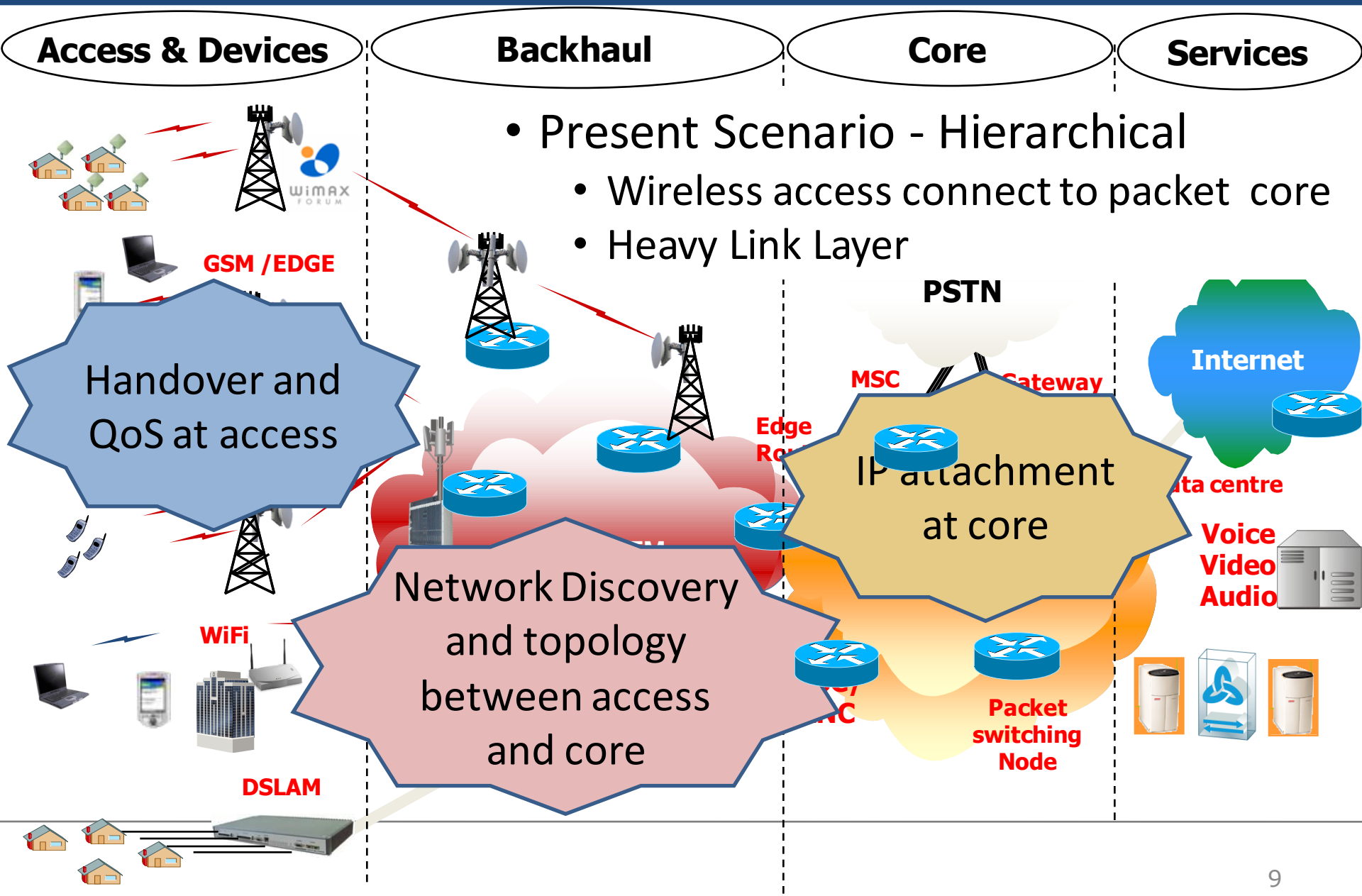


Virtual Radio Access Networks



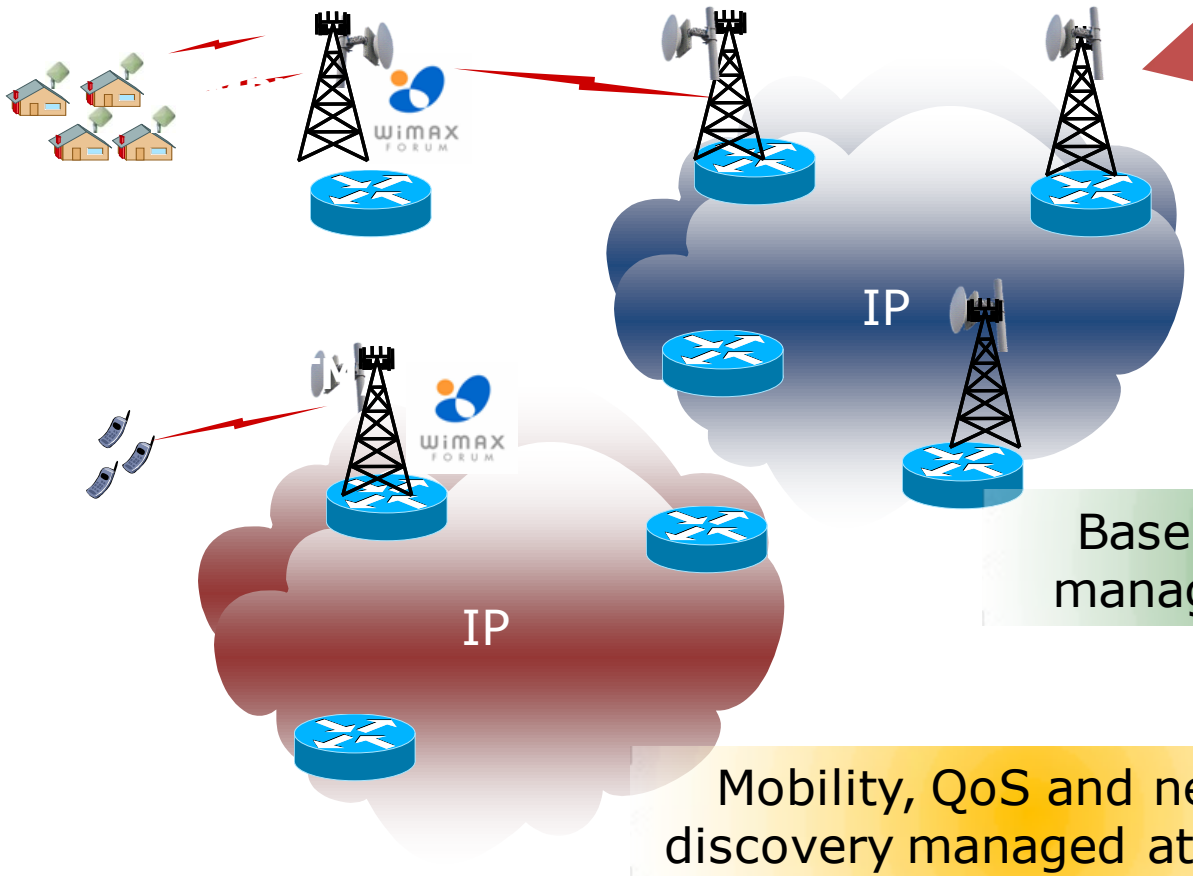
- Active Infrastructure Sharing
  - Reduce BoM for RF equipment
  - Improve energy efficiency
  - Optimize backhaul infrastructure
  - Load share ‘roaming’ between operators
- Technical Innovations
  - Intelligent switching to route and bill the user’s traffic
  - Spectrum management
  - Interference management

IP over Distributed Cellular Architecture



New Paradigm

Wireless access network as IP network of base stations



Self Configuring Distributed Architecture

Base station cooperate to manage topology discovery

Mobility, QoS and network discovery managed at IP layer

Summary

- Backhaul innovations- key to increasing rural coverage
  - FRACTEL project in TTSL-IIT Bombay Center for Excellence in Telecom
- Low cost IP based distributed architecture can bring down cost
  - On going research in IIT Bombay
- Active infrastructure sharing and energy efficient mechanisms also critical for wide spread deployment