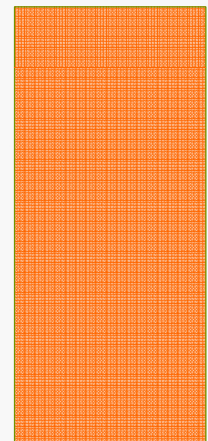


# Policy Imperatives for India Telecom

Post 3G / BWA auctions in India



26-11-2010

CII Conference: Multi-Dimensional Telecom Growth  
Building & Enabling Information Infrastructure

# India has done well

- Expanding the telecom Network to every nook and corner of the nation
  - Making telephony highly affordable using 2G mobile
    - Hiving out tower infrastructure
  - Adding 15 to 20 million subscribers per month
    - Enabling people with very low ARPU to have telephony
      - SMS is highly affordable
      - Also used increasingly for business
        - VAS story just taking off
- 3G / 4G spectrum auctions were highly delayed
  - But now ready to roll
  - Auctions have given huge amount of funds to nation

# But there are challenges

- Broadband in India is still in its infancy
- Too much competition
  - While it has brought down tariffs, operators have become unviable
    - VAS revenue is still small
- Recent Spectrum Auction price have been too high
  - Price of shortage rather than that makes business-sense
    - Have made operations unviable: will hurt roll out in villages
- Indian telecom imports second only to oil
  - Indian Product industry (not CKD/ SKD manuf.) never nurtured
- India owns very little of IPRs
  - CeWIT and TCOE has made a beginning with 4G IPRs
- State-owned Telecom Operators struggling

# India Amongst the Leaders

2005

- Telecom Consumer ✓✓✓✓✓
- Telecom Operator ✓✓✓✓

2010

- Telecom MVNO ✓
- Telecom Design House ✓✓✓✓

2014

- Telecom Product House ✓
- Technology Leaders ✓✓

# Enabling Broadband using 3G / 4G

- Take Fibre to each tower immediately
  - Use USO fund to do this
    - Build and operate based on lowest bid
    - Will enable operators to provide true broadband quickly and at low costs to all villages
  - In absence of wired infrastructure
- Not enough spectrum yet for true Broadband
  - Find and auction at least four more 20 MHz 4G wireless spectrum in 2011 itself
    - Will provide spectrum to provide basic broadband widely
      - Even this will require a lot of R&D to provide quality service

# Make Telecom Operators more viable

- Enable partnerships amongst operators and unlimited spectrum sharing at **no additional costs**
  - Government has already earned significant revenue through auctions
    - Now focus on industry viability
- Enable Mergers and Acquisitions easy and at **no additional costs**

# Value added Services have not been leveraged yet

- SMS is widely used
  - Wide use of **bulk SMS for businesses, banks, cards**
  - Use of bulk SMS even for rural services (also automated voice systems used)
    - Regulate to enable usage for registered businesses even in tense environment: **SMS interconnect**
    - Support **local language SMS**
- Mobile Data Space (GPRS / Broadband) to be similarly used
  - **Enable entrepreneurs** to leverage usage
    - Some very creative innovations in the space
  - Mobile Banking and **mobile to mobile payments** can transform the nation

# Promote Indian Product

- Indian Product: Control and Ownership of R&D, IPR brand, proprietary software, source code and hardware design with the Indian company
  - Indian company gets revenues and commercial value derived from the global sales of such Products
- Product value:
  - Only **marginally in manufacturing** (4 to 7%)
  - Mostly in IPR, design, choice of components
- So India needs a focus on R&D and **acquiring IPR**
  - CeWIT and TCOE has made some beginning: own considerable IPRs in 802.16m and LTE-A
    - Needs enhanced support
  - **True Broadband (on 100 MHz) without wired infra needs lots of innovations**
  - Needs a Indian **Telecom Standards Development Organization**: academia - industry – government partnership (lead by Indian academia)
- Needs Entrepreneurship Support
  - To enable and promote Technology Entrepreneurs
  - About  $\square$ 1000 Crores per year

# Security

- Every electronic product could have a malware in it
  - in IC, in Hardware, in drivers, in OS, in middleware, in application
  - Virtually **impossible to detect**
    - For example: a few hundred gates in millions
    - Deposit of source code is of little use
- The only way out is trust-based equipment and network
  - Diversification helps: not dependent on one vendor
  - And as much possible, **Indian made / designed product**
    - At least the critical elements

# Revitalizing State owned Operators

- National Resources are Bleeding
  - Large manpower (35% of total expenditure)
  - Revenue stagnant
- Steps needed:
  - **Hive off towers** in a separate company
    - Transfer some of the employees to the company
    - Get some private investment
      - Sharing would make this as highly profitable venture
  - Similarly **Hive off its national Backbone network** in a separate company
    - Transfer people and Get investment
  - Also **Hive off Copper Local Loop** in a company
    - Along with large sections of employees and get investment
- Parent company will have three strong profitable subsidiaries and **lean company** which can compete
  - Need to have **strong board and Managing Director**

# What does it take for India to become Technology Leader wireless area?

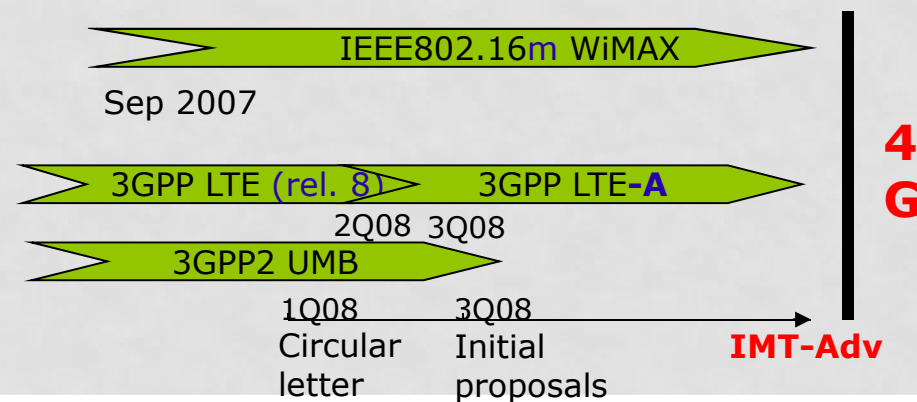
Short-term goal of making royalty  
outflow negligible

# Understand the niche for the nation

- What will industry need -- tomorrow and day after?
  - Who is defining the standards that they would use?
- Who all are driving the emerging standards?
  - What technologies are going into those standards?
  - What, if any, is the technology gap?
- Does India have special requirements?
  - Are those special requirements recognised?
  - Do technologies exist to full-fill these requirements?
    - Who is working on such technologies?
    - Are there scientists in India (or Indian Scientists abroad) who could take lead in fulfilling such requirements?
  - How do we get them to take a lead
    - And how does one get industry behind such efforts?
    - How does one get government behind such efforts?
    - And the funding required!

# Wireless is the Key to Broadband Access

- Wireless got telephony to everyone in emerging markets
  - Wired line infrastructure is too poor
- **Wireless** will get **Broadband** to everyone
  - **Unlike the West, there is no wireline infrastructure** for this!
    - GPRS / EDGE/ 3G-1x / EVDO available today
      - Increasing use of wireless Internet even in rural India
    - 3G (HSDPA), LTE and WiMax 802.16e (wireless auction)
      - But they struggle to provide 2-3 bps/Hz/cell
    - And eventually 4G technology: 802.16m and LTE-A



# To make India a leader in Wireless Technology

- India takes an initiative three years ago

- to create a **public-private** organization

*Center of Excellence in Wireless Techn*

- Initially funded Government: industry = 2:1
- To be Lead by Academia
- Attract top R&D talent from around the world
- Drive Research towards IPR creation
- Create a cluster of Industrial R&D around it



*Broadband  
Wireless  
Consortium of  
India*

and CEWiT initiates set up of *Broadband Wireless Consortium of India (BWCI)*

- Telecom operators, Academia, Government / Regulators, Product Industry, Semiconductor Industry
- To define and drive R&D and standardization to make India leader in wireless technology

# India's Achievements so far

- CeWIT takes India's Broadband Wireless Requirements into 4G standard bodies
  - Both LTE-A as well as 802.16m
  - Has six essential and 6 other IPRs accepted in the 802.16m standards
    - Many in LTE-A under consideration
- CeWiT and TCOE were evaluators of standards for IMT-A (ITU)
  - Year long process where claims of all standards were validated, strengths and shortfalls documented
- At the same time
  - Creating industrial infrastructure around CeWIT
  - Jointly Building Hardware Software Blocks for 4G standards
  - Conducting field trials and evaluations
  - Connecting Indian academia to Design / Manufacturing Industries

# BWA Technology choices & performance

| Technology                       | DL Spectral Eff.<br>(bps/Hz/sector) | UL Spectral Eff.<br>(bps/Hz/sector) | Availability                |
|----------------------------------|-------------------------------------|-------------------------------------|-----------------------------|
| HSPA Rel 6*                      | 0.53                                | 0.33                                | today                       |
| HSPA Rel 8**                     | 1.51                                | NA                                  | soon                        |
| DO Rev B***                      | 1.0                                 | NA                                  | today                       |
| DO Rev C                         | Target: Rev B x 2,                  | no published results yet            | 2011?, standard in progress |
| TD LTE (2x2)*                    | 1.64                                | 0.81                                | 2011?                       |
| LTE (4x2)* (assume same for TDD) | 1.93                                | NA                                  | Late 2011?                  |
| WiMAX 16e* (2x2)                 | 1.15                                | 0.62                                | today                       |
| <b>WiMAX 16e+# (2x2)</b>         | <b>1.6</b>                          | <b>1.05</b>                         | <b>Dec 10 soft-upgrade</b>  |
| WiMAX 16e+# (4x2)                | 1.85                                | NA                                  | 2011?                       |
| <b>WiMAX 16e+i (2x2)\$</b>       | <b>2.23</b>                         | <b>1.05</b>                         | <b>Dec 10 soft-upgrade</b>  |

Sources: \*NGMN Ph2 Report 2008; \*\*Ericsson; \*\*\*Motorola, IEEE Globecom2007; #Wimax Forum 2009; \$CEWiT 2010

**802.16m or LTE-A being examined by IMT as 4G standards: Availability 2012**

# 16e+i Proposal and Advantage

- **Fast forward CEWiT contributions** into 16e+ to create 16e+i
  - Part 1: Open Loop Region with best-band scheduling - possible with **software changes only** in BTS and terminal
  - Part 2: CDR and CoFIP - terminal requires minor PHY hardware change
- Spectral efficiency of **2.23 bps/Hz** on DL in Phase 1 itself
  - 16e+i is **backward compatible** with 16e/16e+
    - Legacy terminals will work; Can roam into 16e/16e+ networks
- **16e+i can actually make 4G a reality**
  - No other technology comes close
    - Cost effective: 2x2 configuration (much cheaper than 4 x 2 configuration)
    - Mature platforms: Roaming possible in US, Japan
- **Based on Indian IPR**
  - Will result in India becoming leading voice in WF and 802.16
    - development of India-based vendor ecosystem

# To Sum Up

- Indian telecom has done very well in last decade
  - But operators are **now struggling** a bit
- Government has gained a lot
  - Excellent **service** to its citizens
  - Large **revenue**: license fee, spectrum charges, USO charges, taxes
  - Now need to focus on
    - Making Broadband available to all its people (villages)
    - Keeping Industry healthy
    - Promoting Indian IPR and Product industry
    - Security