WiMax: Broadband Wireless Access For Bridging Digital Divide

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“Digital Divide”

- **“***You are talking about the Internet,*
  you are talking about cell phones,
  you are talking about computers.
  *This doesn't affect two third of the people of the world***.”**

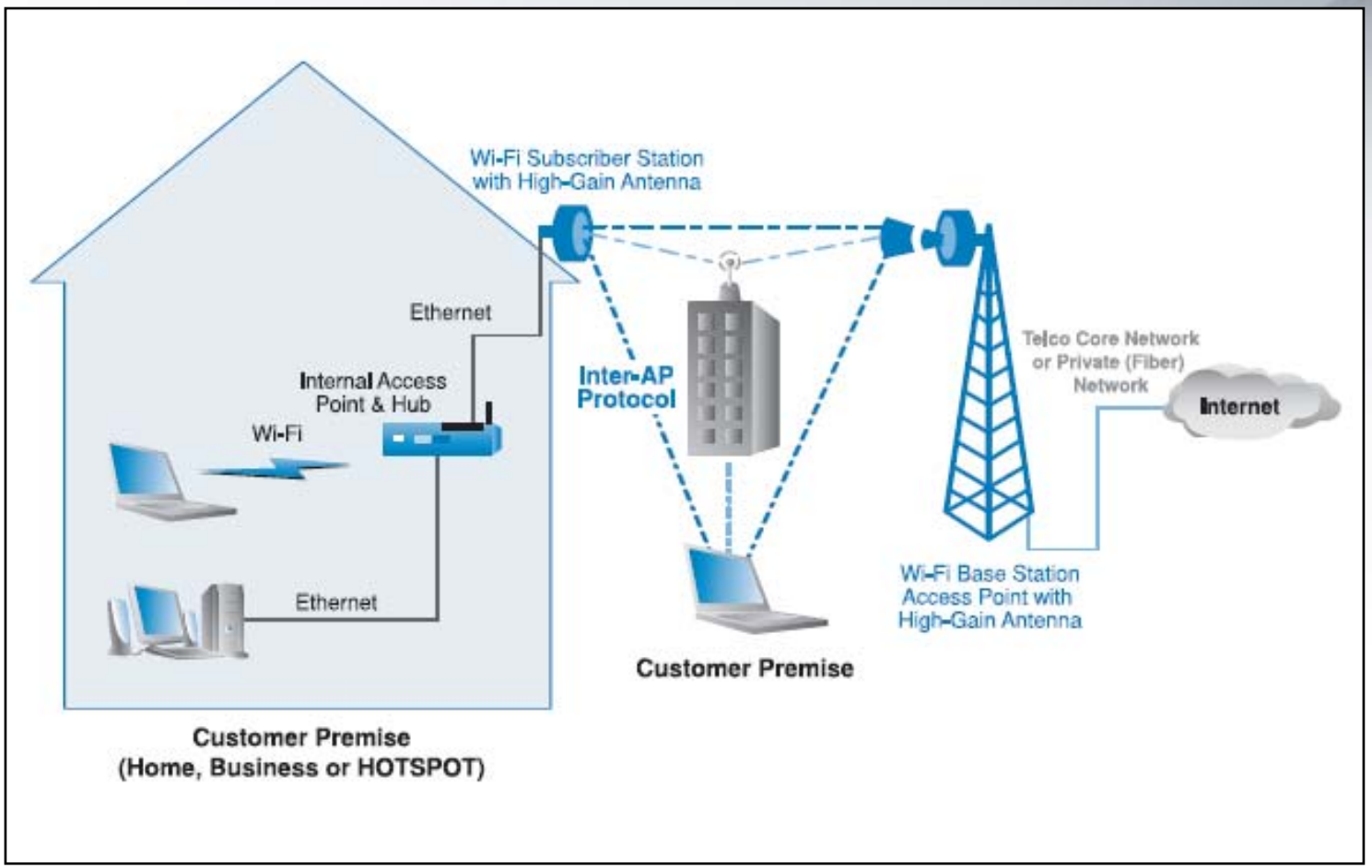
  -- Kofi Annan

- *The term “digital divide” refers to multi-dimensional inequalities in Internet access and use, ranging from the global level, to nation states, to communities, and to individuals.*

Why Wireless Broadband Internet for Bridging “Digital Divide”?

- One of the major reason for low penetration of computers is lack of broadband internet
- Lack of wired communication infrastructure in India and other developing countries makes broadband internet connection costly
- Educational: Virtual classroom, distance education...
- Communication: Video conference, Audio/Video streaming, IP Telephony…
- E-Governance

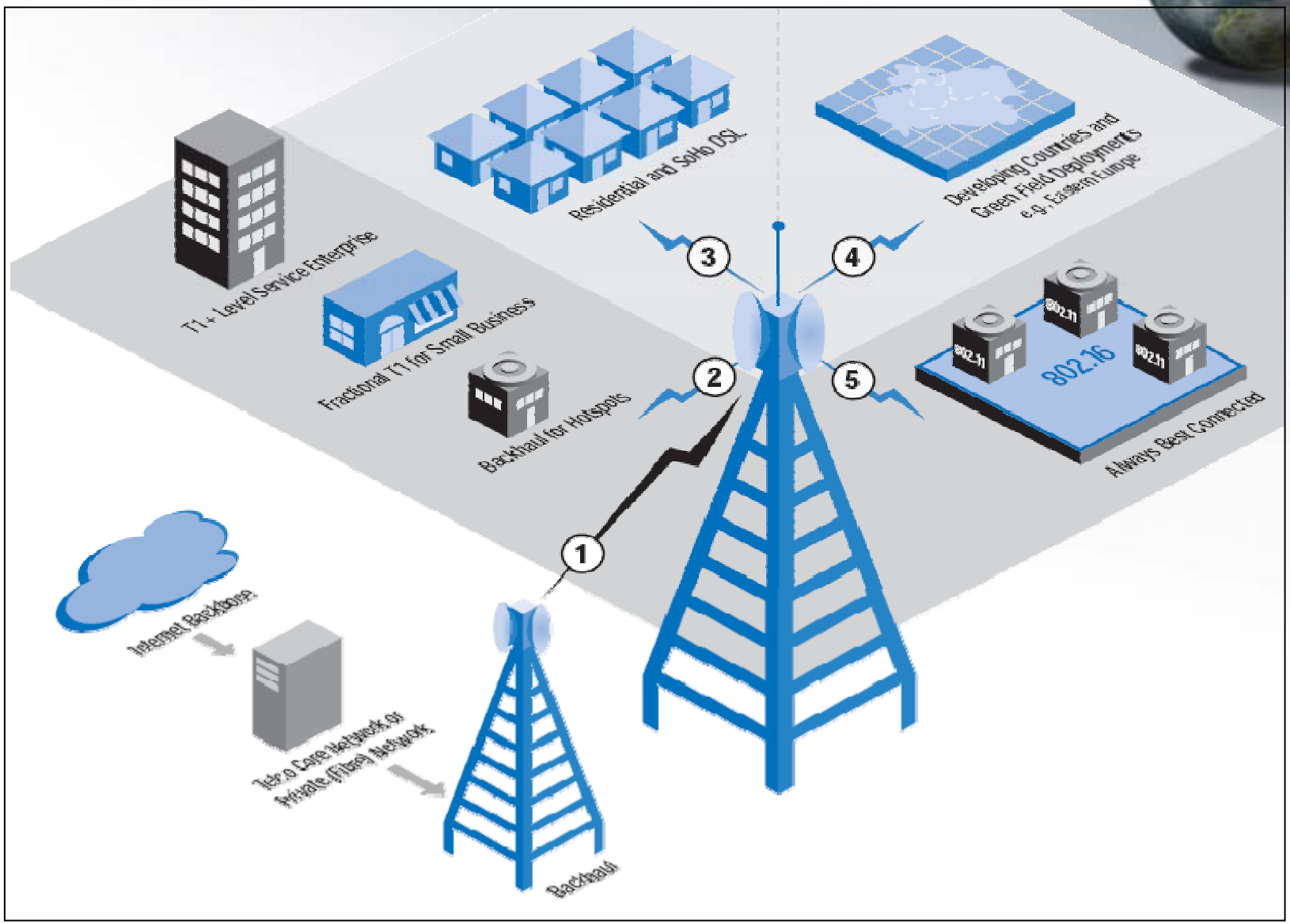
What's wrong with Wi-Fi?



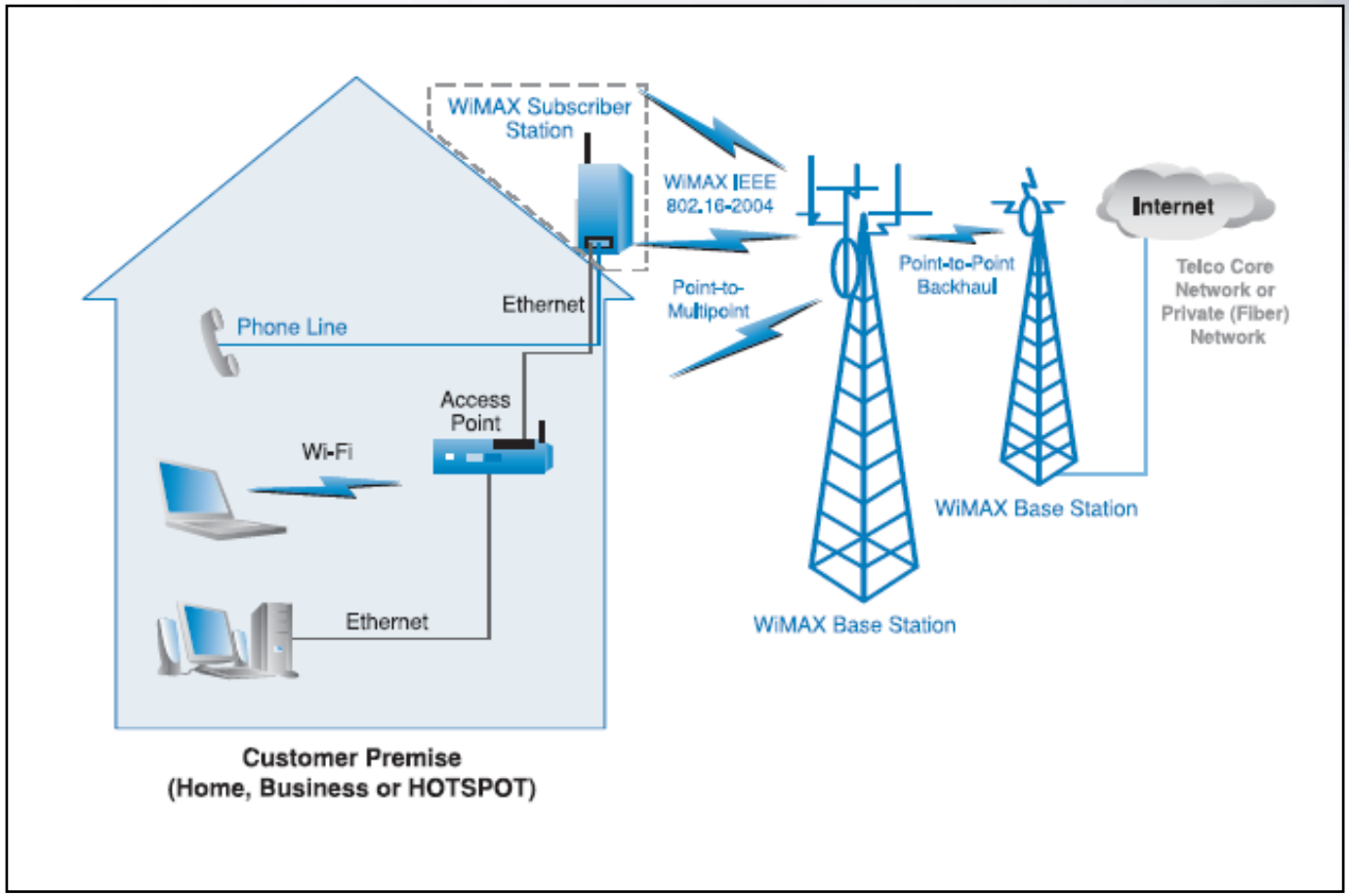
WiMax: Worldwide Interoperability for Microwave Access

- WiMAX: Associated with IEEE 802.16a/REVd/e standard
- Peak Data Rate: 75Mbps (20MHz Channel) 18Mbps (5MHz Channel)
- Modulation Technique: OFDM
- Range (Outdoor): 2 - 10 Km
- Average User Throughput: 1-3Mbps
- LOS and NLOS Implementation
- Can operate in both, licensed and unlicensed band

WiMax usage Scenarios



WiMax as Metro Access Development Solution



WiMax for India?

Driving Factors for WiMax in India

- 3G is costlier and inefficient
- 2+ million mobile subscribers added each month
- 60% of Urban households can spend under $7 /month on Telecom
  - can spend $ 50 for terminal..

Challenges in India

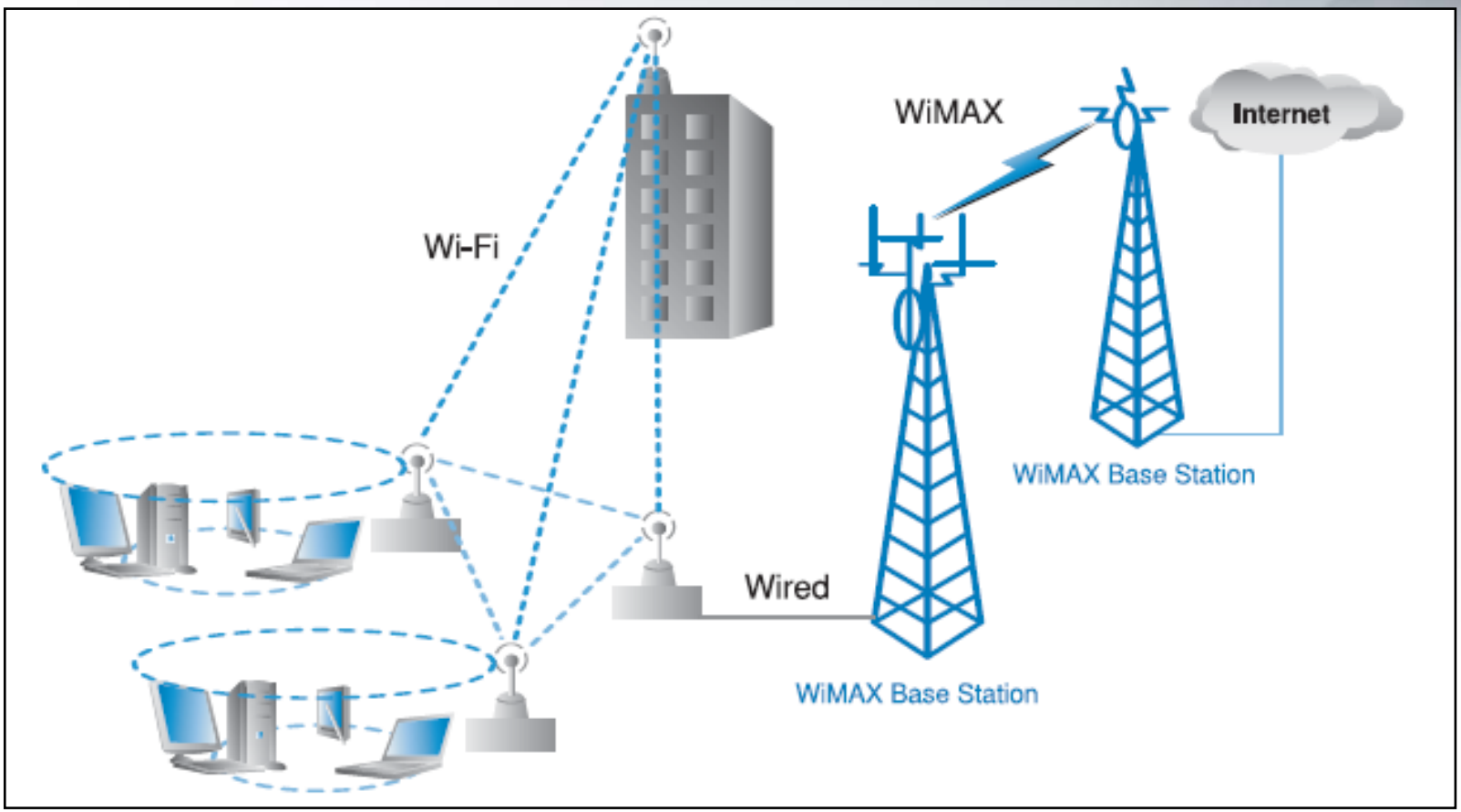
- How will it work along with 2.5G / 3G cellular?
- What will be the Infrastructure cost
- India has 700 million rural population in 600,000+ villages in India (about 1000 people per village with per-capita income of **$ 0.40 per day**)

Comparison of Cellular Technology with WiMax

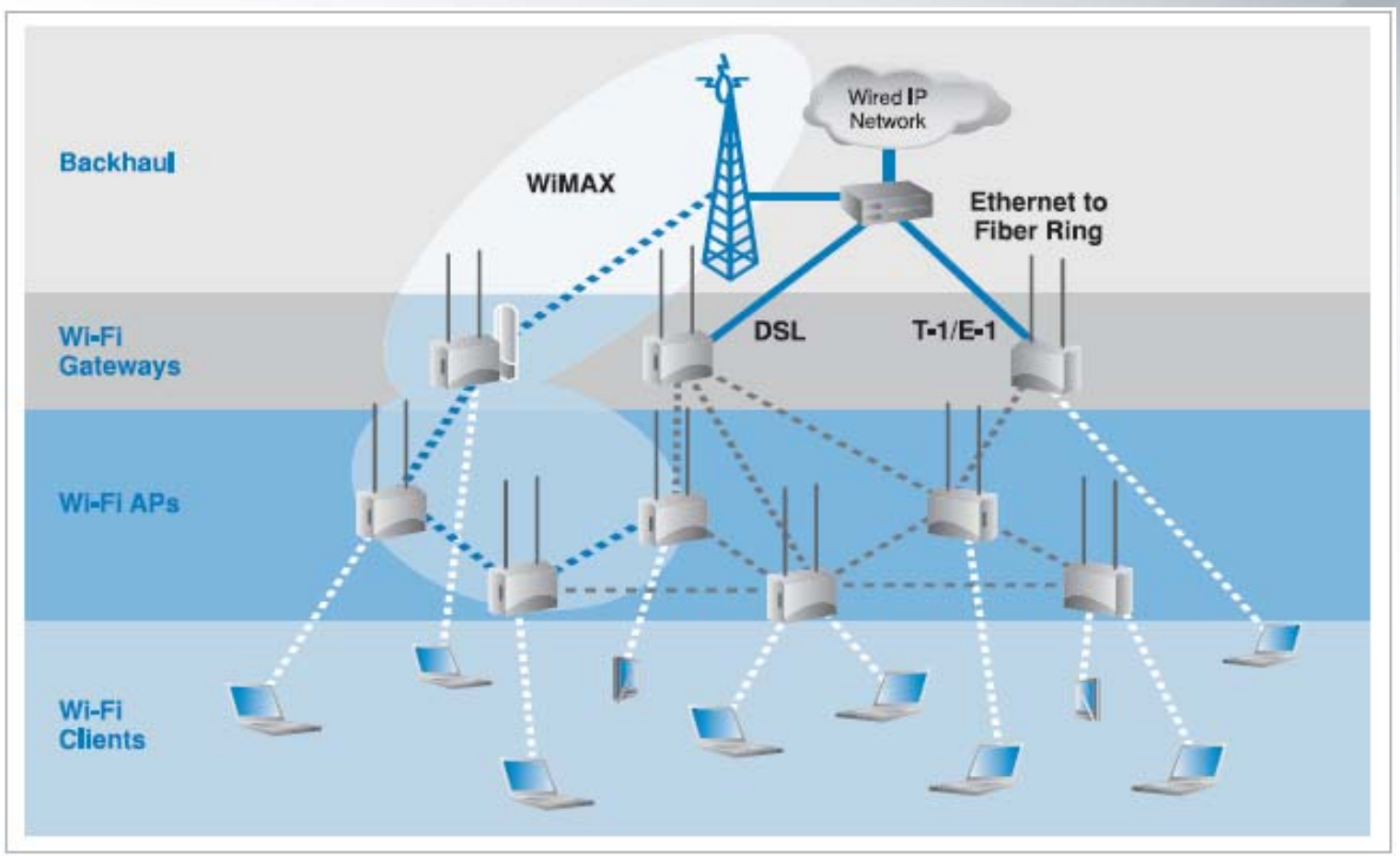
	Cellular			WiMAX	
Metric	**Edge**	**HSPDA**	**1xEVDO**	**802.16-2004**	**802.16e†**
Technology Family and Modulation	TDMA GMSK and 8-PSK	WCDMA (5 MHz) QPSK & 16 QAM	CDMA2K QPSK & 16 QAM	OFDM/OFDMA QPSK, 16 QAM & 64 QAM	Scalable OFDMA QPSK, 16 QAM & 64 QAM
Peak Data Rate	473 Kbps	10.8 Mbps	2.4 Mbps	75 Mbps (20 MHz channel) 18 Mbps (5 MHz channel)	75 Mbps (Max)
Average User Throughput	T-put < 130 Kbps	< 750 kbps initially	< 140 Kbps	1–3 Mbps	80% performance of fixed usage model
Range Outdoor (Avg Cell)	2–10 kms	2–10 kms	2–10 kms	2–10 kms	2–7 kms
Channel BW	200 KHz	5 MHz	1.25 MHz	Scalable 1.5–20 MHz	Scalable 1.5–20 MHz

Recommendation for Deployment

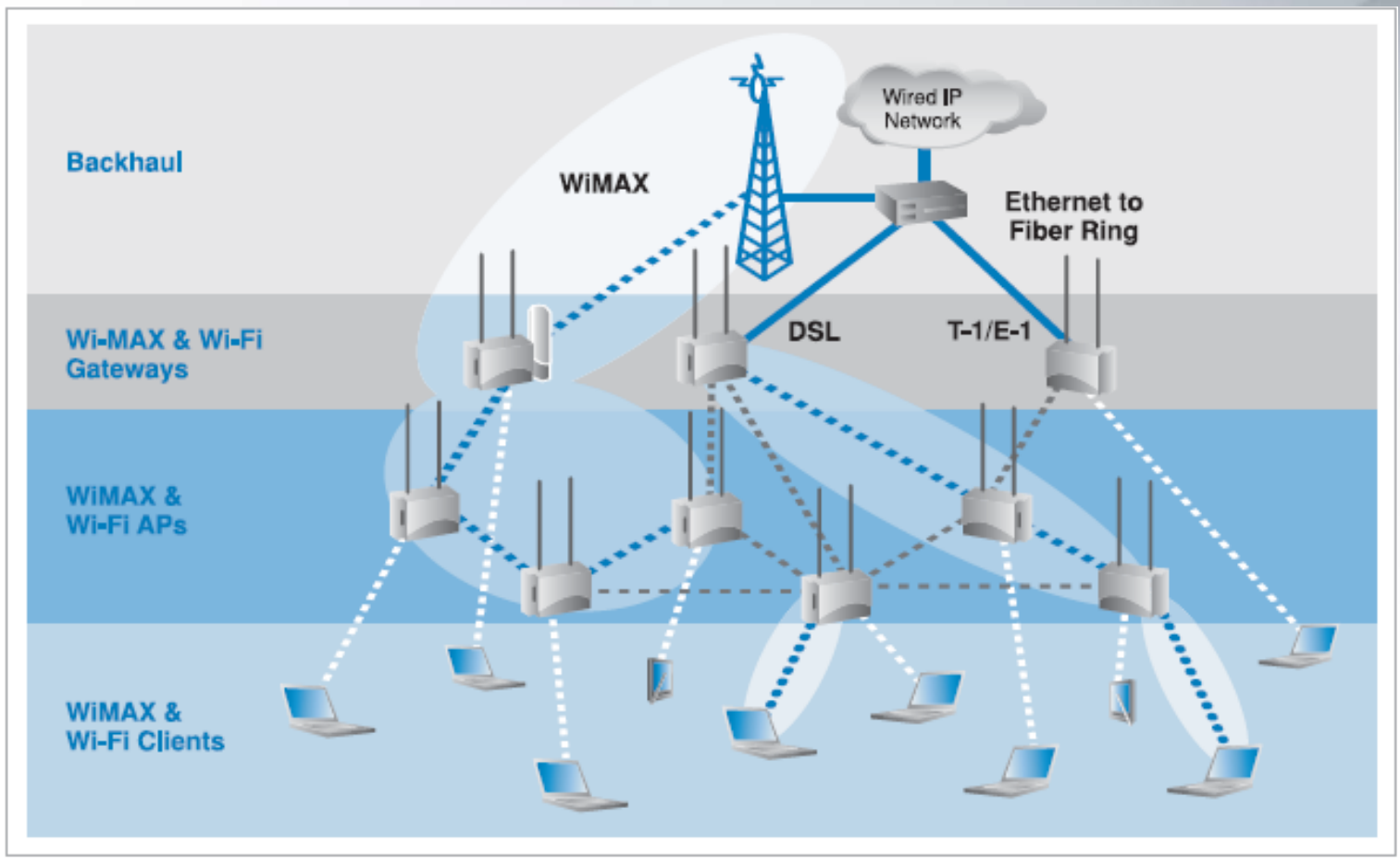
Phase – 1: WiMax Backhaul for Wi-Fi mesh topology



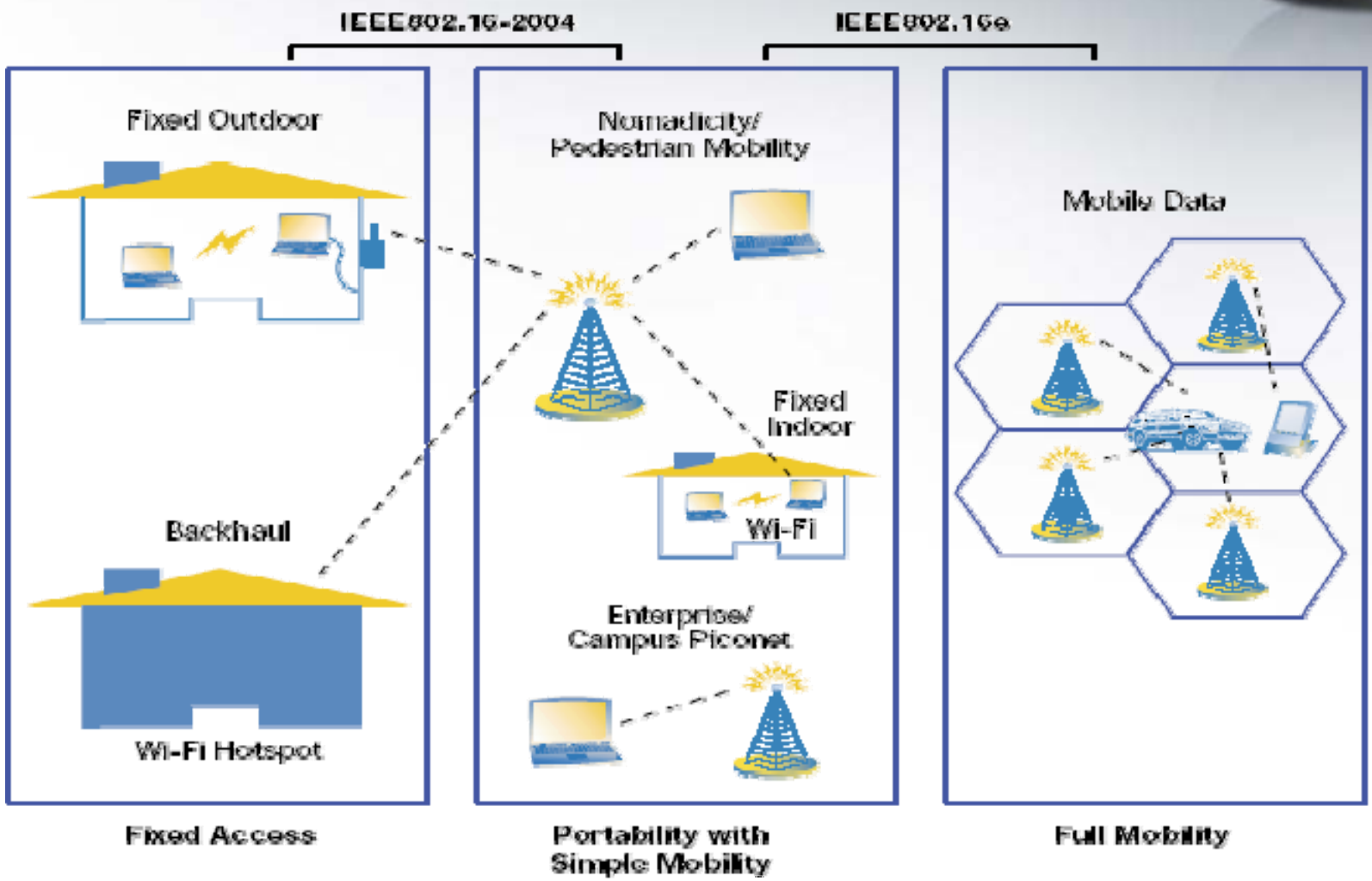
Phase – 2: WiMax as intra-mesh Backhaul option



Phase – 3: WiMax as client connection option



WiMax Evolution



Summery

- Initially, WiMAX will bridge the digital divide and the scope of WiMAX deployment will broaden to cover markets where the low POTS penetration, high DSL unbundling costs, or poor copper quality have acted as a brake on extensive high-speed Internet and voice over broadband.
- India is a large wireless market, but only at the right price
- Broadband Internet at homes likely to be a large market
- High-speed wireless broadband technology based on WiMAX promises an economically viable solution to accelerating the Internet adoption that can revolutionize lifestyles in India.

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Thank You!