Mobile Broadband Overview

ITU Workshop on ICT in Vehicles
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Agenda

- What is Mobile Broadband
- Why mobile broadband
- Market for Mobile Broadband
- Challenges in Mobile Broadband
- iBurst as a deployed mobile broadband service that supports vehicle speeds
  - What is it
  - Economics
  - Path to standards and ITU involvement
  - Deployments
  - Vehicular application

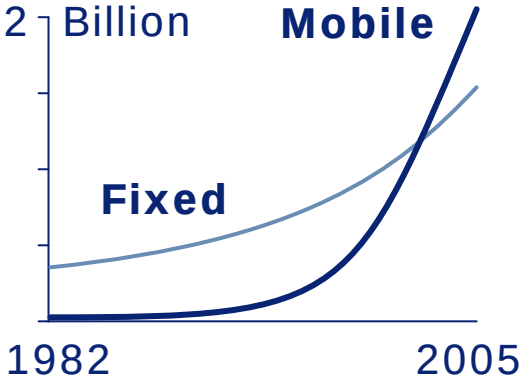
What is Mobile Broadband

- Delivery of data at high data rate. (~1-4Mbsp)
- Non-Line of site data transmission
- Features continuous access regardless of location with simple installation
- Allows delivery of broadband services to mobile environment (VOIP, Video, Multimedia)
- A reliable and more cost effective solution than existing fixed or wireless technologies.
- Bypass incumbent networks for last mile access.
- Applied Smart Antennas technologies increase spectrum efficiency.
- Mobile Broadband technologies are disruptive.

The mobility imperative

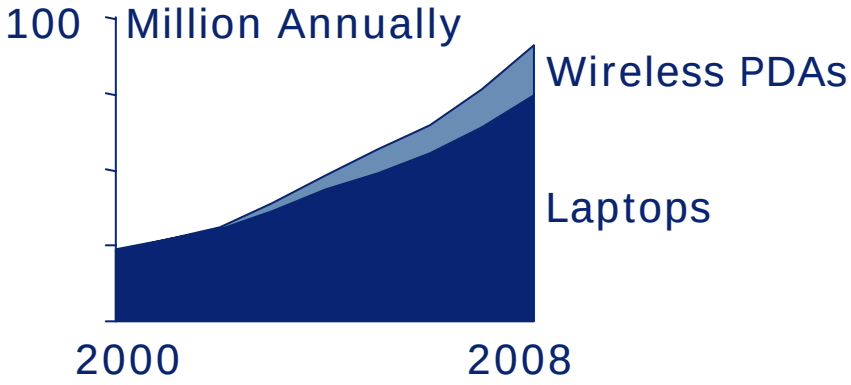
Subscriber demand will drive mobile broadband network deployments

Worldwide Voice Subscribers



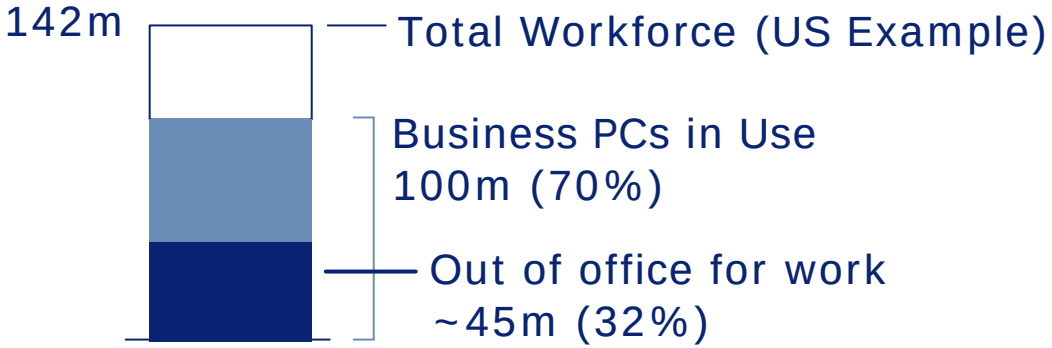
Source: ITU

Worldwide Device Shipments



Source: Gartner

Inherent Occupational Mobility

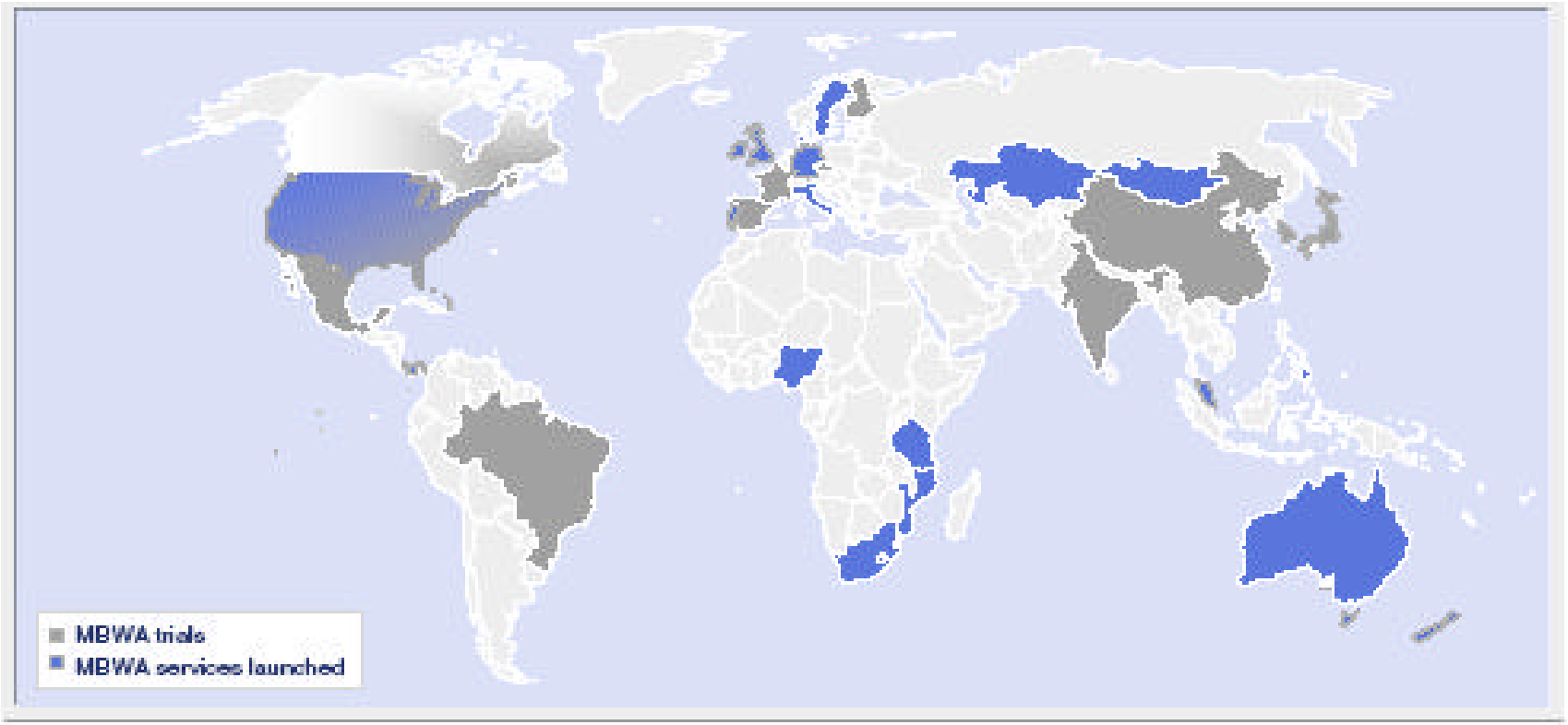


Source: US Bureau of Labor Statistics, ITU

Mobile Broadband Market

- Current wireless data services is a validation the for mobile broadband market
- Need for higher data rates and enhance performance.
- Extending connectivity to mobile environments: Airplane, Train, and Automobiles
- Maintain continuous access to networks and enhance productivity
- Introduction of new application and services
- **Development of new technologies**
- **Building on the growth of existing wireless system and reaching beyond current limits.**
- **Alternative carriers interest to provide independent last mile access.**
- **Drive to increase revenue within saturated wireless markets.**
- **Continuing regulatory interest in Wireless technology**

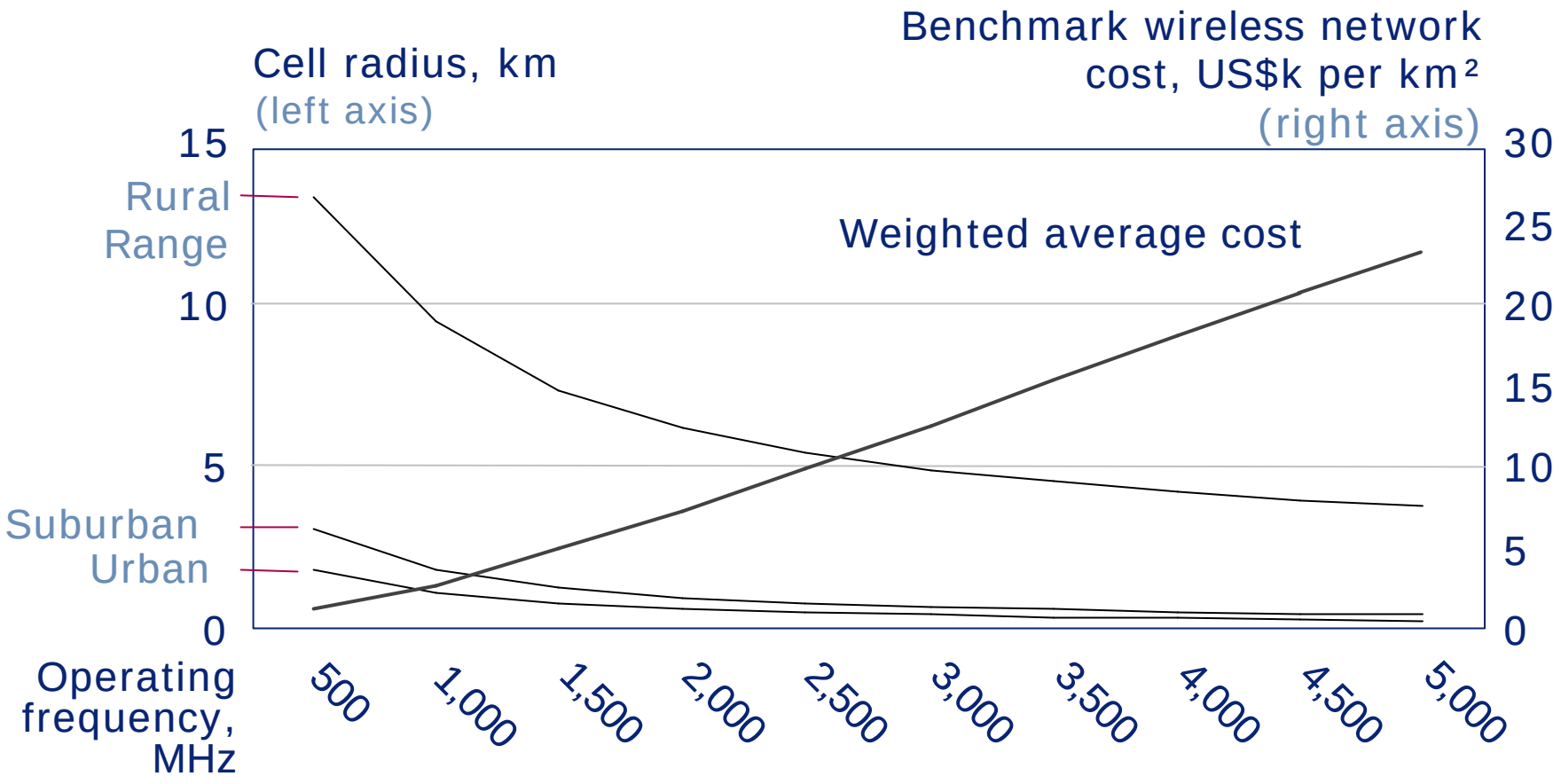
The mobile broadband future in the present



- Commercial Networks in service with standardized and proprietary technologies
- iBurst, Navini, Flarion, IP Wireless are market leaders
- Networks in commercial service with proprietary technologies
  - ✓ Australia: iBurst and Navini
  - ✓ South Africa: iBurst

Mobile Broadband Challenges

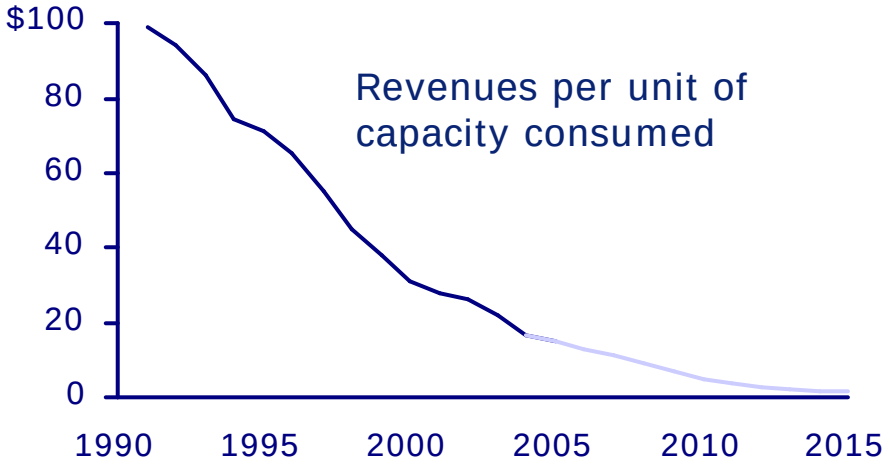
- Scarcity of Spectrum
- Capex and Opex at higher frequencies



The challenge continues to intensify

Subscribers

Commoditization



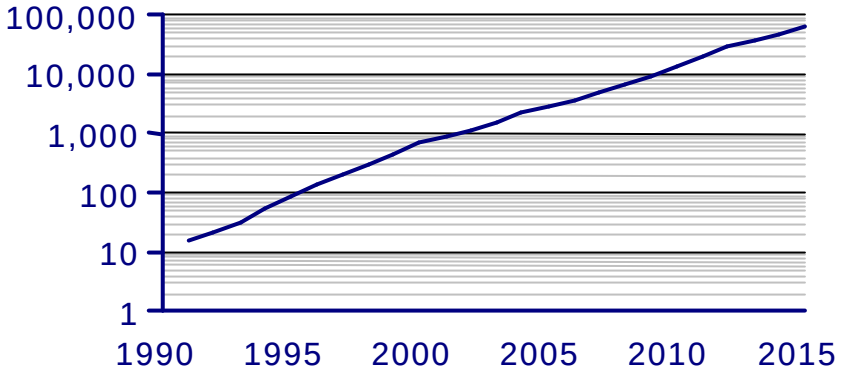
Monthly ARPU per kbps/user in busy hour

- Low subscriber switching costs
- High sensitivity to service quality
- Extreme price pressure

Operators

Exponential Usage Growth

Total busy-hour wireless network usage, Gbps, worldwide



- Continually rising capital and operating costs

Sources: ITU, analysis.

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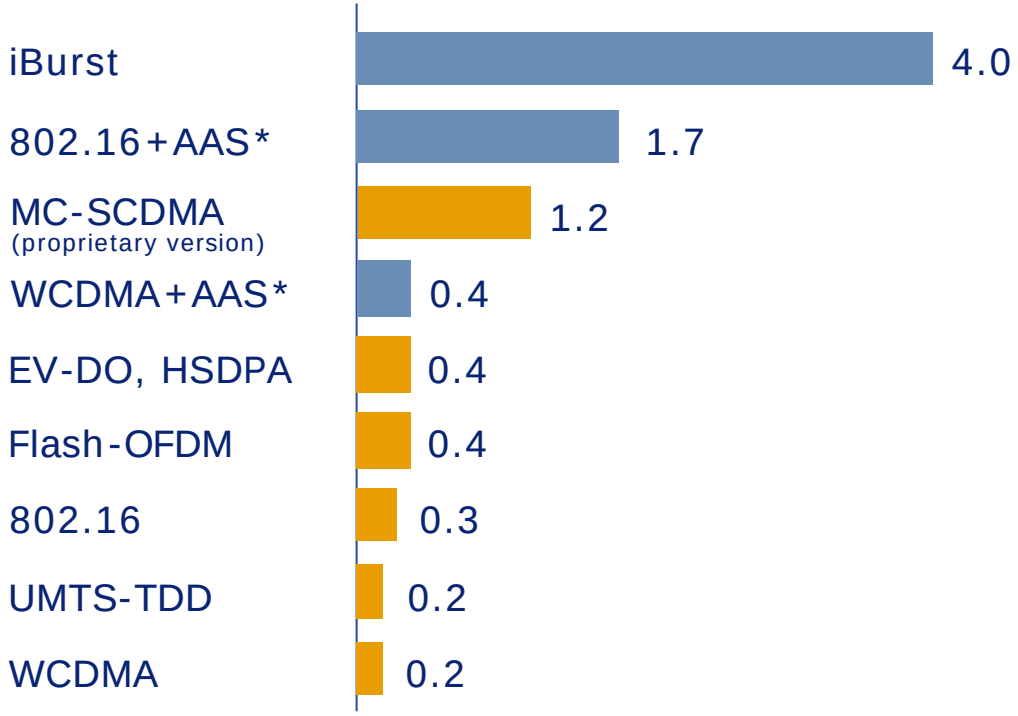
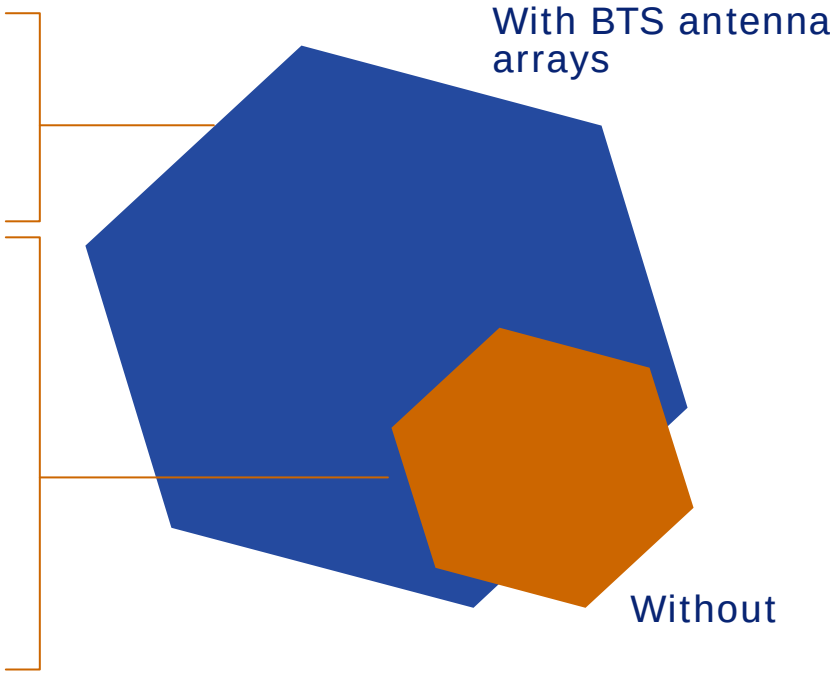
Performance gains through smart antennas

System Capacity

Mobile Wireless System Capacity in Mature Networks,
Mbps aggregate BTS capacity per MHz available



System Range



*Standard protocol with base station enhanced by fully-adaptive antenna system

Sources: Vendor claims for maximum BTS throughput, ArrayComm field experience in Korea and Australia, various analysts.

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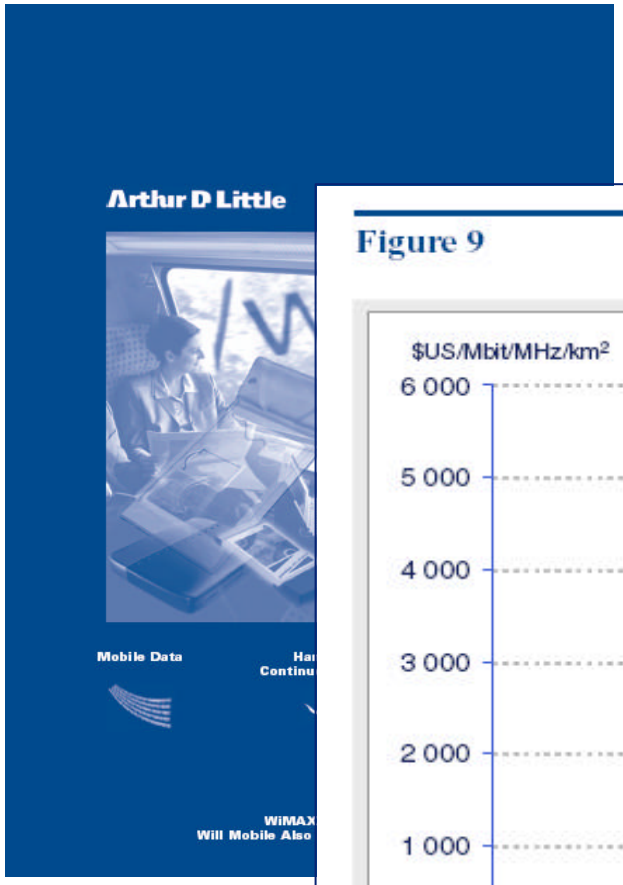
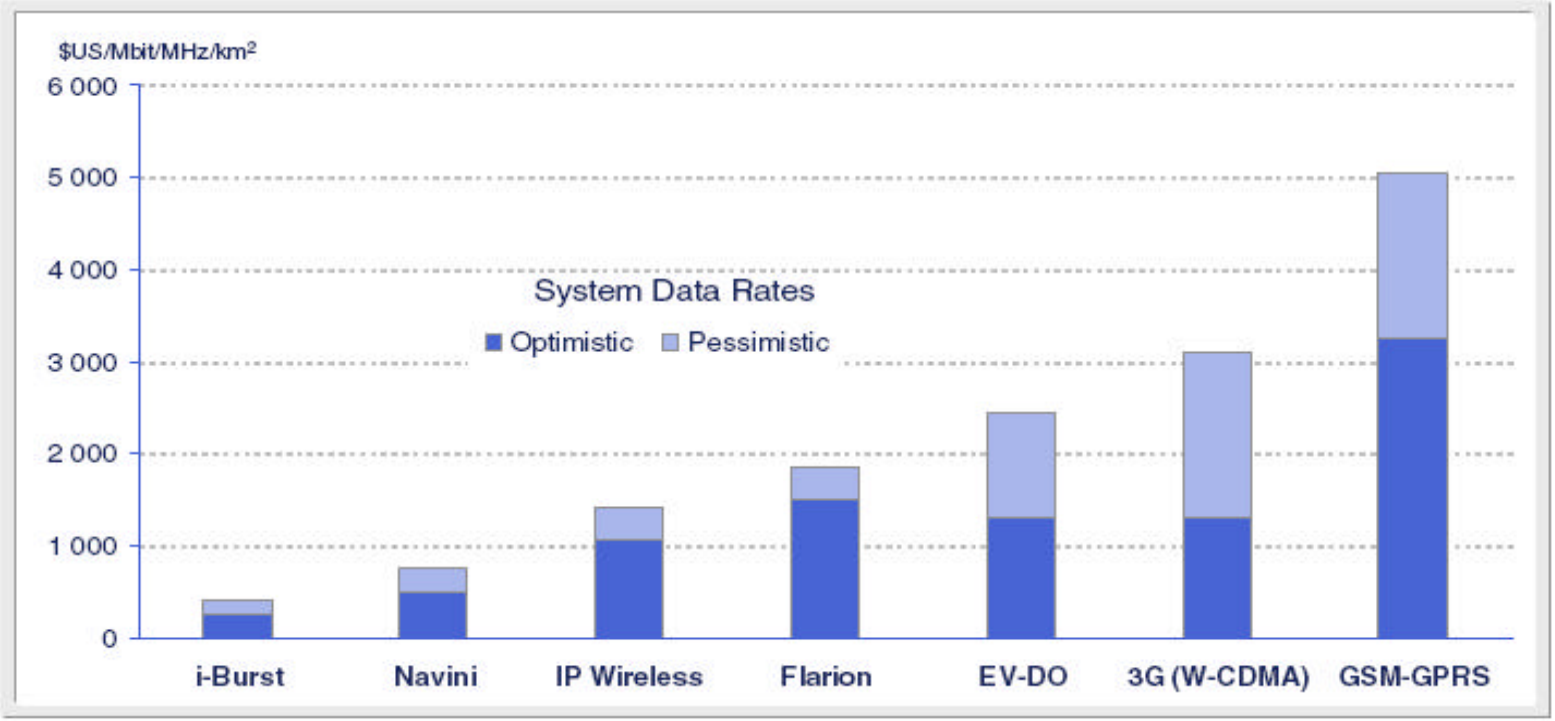
System economics vary widely



From the recently-released ADL white paper on mobile broadband wireless: "Cost of Delivery"

Figure 9 Comparative Delivery Costs for Broadband Wireless Data



Sources: Vendor specifications, Arthur D. Little analysis

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Wireless industry evolution is difficult to forecast

Standard	History and Status
3G	• Technology billed as broadband wireless revolution • Deployments much slower than ever expected • Current economics preclude true broadband services; focus is on voice capacity extension and mass-market multimedia features on handsets
802.20	• ArrayComm and Flarion initiated at IEEE to standardize their respective proprietary broadband wireless systems • Incumbent CDMA-2000 camp stalled activity by leveraging one-person, one-vote process
802.16	• Initially fragmented and focused on fixed services only • Intel + several large equipment manufacturers began pushing development and harmonization • 802.16e (mobile WiMAX) emerged in competition with .20 • Unprecedented industry structure driving expectations of disruptive network costs (analogous to PCs and minicomputers) in 2007 and beyond
802.11	• Initially for local-area connectivity only • Municipal deployments, mesh architectures, and other innovations encroaching on wide-area systems

A Look at Mobile Broadband

System Definition

- IP transport for last mile
- Broadband user data rates (1 Mbps now, 2-4 Mbps planned)
- Wide-area coverage
- Support of any Internet application, including VoIP
- Leverages smart antennas for range and capacity
- In commercial service now in Australia and South Africa, development in many countries including Ghana and India, and test license in Japan
- ***High Data rates at 100kph***
- ***Only commercial service supporting mobility with broadband experience***
- ***Reseach focused on enhancing range, capacity and coverage at higher velocities.***

Subscriber Segments

Mobile **Fixed**


Business


Residential

iBurst™




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iBurst standardization

- ATIS Wideband Wireless Internet Access
  - » In the process of being standardized as High Capacity-Spatial Division Multiple Access (HC-SDMA) radio interface
  - » Expected completion this summer
- 802.20
  - » iBurst community still very active in working group
  - » Target for next generation iBurst/HC-SDMA proposal
  - » Standard possible in 2007
- ITU
  - » Involved in ITU-R WP8F ‘Systems Beyond IMT-2000’ and ITU-D SG2 Broadband Wireless Access study
  - » System complies with ITU-R Recommendation M.1678 on Adaptive Antennas for Mobile Systems
- ETSI
  - » Included in Project MESA

Status of ITU BWA activities

- ITU initiatives promoting Broadband Wireless Access
  - » Numerous ITU sponsored seminars (e.g. ITU-APT BWA Seminar)
  - » Draft New Report on Question 20/2: Broadband Access Technologies
    - Gives equal treatment to “standardized” and “proprietary” systems and includes a section on iBurst
    - Broadband report to be approved at the ITU-D Study Group 2 meeting in September 2005
    - Report will be presented to the World Telecommunications Development Conference in March 2006
  - » World Summit for the Information Society (WSIS) includes initiatives to develop and strengthen national, regional and international broadband network infrastructure
- ITU-R Study Group 8
  - » Next meeting of Working Party 8F on June 8-15, 2005
    - Considering sharing studies between 3G and BWA systems
    - Preparing for WRC-07 that will address spectrum for “systems beyond 3G,” such as new MBWA systems
  - » Next meeting of Working Party 8A on April 11-15, 2005
    - May consider contributions related to Mobile BWA systems

Summary

- Mobile broadband is here and will continue to grow
- The wireless industry will continue to produce multiple standards, with churn along the way
- The iBurst system is a concrete example of mobile broadband technology in commercial service today.
- Mobile broadband will enable new applications and services
- New subscriber modes of work and play and enhance productivity
- Mobile Wireless Broadband systems can effectively serve the vehicular applications.

Thank you!

Questions?