



eTinium, Inc.

Seamless Mobility for the Broadband Wireless Industry

Stanford US-ASIA TECHNOLOGY MANAGEMENT CENTER

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Seamless Mobility

- Trend Towards Seamless Mobility:
Anytime / Anywhere / Any Device
Access
- 40-45 Million Road Warriors (In US),
70-80 Million Mobile Workers
- Seamless Mobility Is the “Killer App”
- How Do We Get There?

How Do We Get There?

- Many Different Wireless Networks Are Necessary:
 - ❖ WWANs
 - ❖ WLANs
 - ❖ WPANs
- These Are Not Competing Technologies, but Complementary
- Wireless Pie Is Still Growing. Momentum Across Different Technologies

Growth In Wireless Technologies

- WWAN Expected to Ship Over 800 Million Units by 2004
 - ❖ Next Generation Technology Driving Numbers (2.5G & 3G)
- WPAN (Bluetooth Only) Forecasted to Ship Over 600 Million Units by 2004
 - ❖ Mostly Cell Phones (e.g. Headsets); PCs, PDAs and Automotive Applications
- WLAN Expected to Ship Over 35 Million Units by 2004
 - ❖ PCs, Handhelds

WPANs

● Bluetooth

- ❖ Cable Replacement
- ❖ When It Becomes Pervasive, We Will Wonder How We Ever Did Without It!

● UWB

- ❖ Short-range High Speed Data Transmission
- ❖ Will Revolutionize Home Networking

WWAN

● 2.5G (GPRS, CDMA-1XRTT)

- ❖ GPRS Take-up Disappointing in Hong Kong. Slightly Better in Singapore
- ❖ Japan No Real 2.5G, Leader in 3G
- ❖ Per M/b Pricing Is Not Attractive
- ❖ Same Always-On Capability of 3G. Slower
- ❖ Lower Cost of Buildout: (3G 15X of 2.5G)*

WWAN

● 3G Is Delayed: Japan Telecom, SK Telecom, NTT DoCoMo, Many European operators

- ❖ Technology
- ❖ Cost & Absence of Capital: \$150B or \$20/POP
- ❖ Coverage (NTT 100K Subs in 5 Cities)
- ❖ Handsets: Sony/Ericsson, Toshiba/Siemens
Matsushita/Motorola,
 - Interoperability Issues & Short Battery Life
 - Shipping in 03
 - Critical Mass Expected in 04.

WWAN

- Pricing Is Difficult: Per Mb?
- Data Usage Unclear (Only 10% of Revenues): Apps & Demand?
 - ❖ Video, Movies, Music, Purchasing??
 - ❖ Handset Prices Will Price Youth Market Out
 - ❖ UMTS Forum Cut Revenues By 17% (\$10B)

WWAN

- BUT...Ubiquity Is King
- UMTS Forum Still Expects Revenues To Reach \$233B by 2010
- For Wireless Data, 2.5G/3G/WLANs Are Trojan Horses For Each Other
- WLAN Will Bring \$2.8B to 3G Service Provides (UMTS Forum)

WLANs

- Industry Advances Leading to Massive Growth
- Ubiquity at Home/Enterprise/hotspot
- Free Spectrum (Just Deregulated in Australia- Need License)
- Low Deployment Costs (Especially In-building and Dense Metro)
- High Bandwidth
- Conducive to “Portable” Data

WLANs: Real World Considerations

- Security
- Standards Wars
- Interference
- Demise of Telecom Market
- Business Model Weaknesses
 - ❖ Absence of Roaming/Billing: Charge by MB or by Time?
 - ❖ Revenue Sharing
 - ❖ Still an Orphan

Who Owns the Space?

- In USA, WISPs Are Eager, but Don't Have the Clout. Service Providers Have the Clout but Are Not Eager:
 - ❖ Own the Customer Relationship
 - ❖ Have Operational Expertise
 - ❖ Have the Back-haul Network

Who Owns the Space?

- Asia and Europe Are Ahead of the US:
Leaders in Asia are Australia, Hong Kong, South Korea, China and Singapore
 - ❖ Growth in Asia Expected at 51%/Yr to 2005
 - ❖ 25% of Unit Shipments in 2002

Who Owns the Space?

● Hong Kong

- ❖ Pacific Century CyberWorks in Hong Kong Airport
- ❖ Recent Housing Built w/WLAN

● China:

- ❖ Nanjing Telecom (Sub of China Telecom) in Nanjing International Exhibition Center

Singapore

- StarHub launched WLAN Service in Suntec City: One of Largest Installations. Offices & Public Areas
 - ❖ Exploring Integration w/GPRS & W-CDMA Network
 - ❖ Plans for Other Hotzones
- SingTel: 150 Wireless Surf Zones: Starbucks, Burger King, ShangriLa Hotels, Country Clubs, etc.
 - ❖ Will Also Wholesale the Service to ISPs, et. al

Australia

- Telstra Purchased Assets of SkyNetGlobal w/Hotspots in Singapore & New Zealand
- Xone: Largest Internet Zone N. Sydney
- Pacific Internet: Sell DSL & WLAN
- WLAN Used By Some Companies to Deliver Last Mile Access (BigAir)

Korea

- WLAN Service a Winner for World Cup
- All Mobile Operators in Korea Are Involved in the WLAN Space:
 - ❖ Korea Telecom Secured 1000 Hotspots
 - ❖ Hanaro Telecom 300 Hotspots
 - ❖ Dacom, Thrunet & SK Telecom
 - ❖ SK Telecom & KT Working on EV-DO/ WLAN Roaming

Japan

- World Cup Winner: WLAN, Loser: 3G
- NTT Communications HotSpot
 - ❖ 200 Locations to Expand to 1000 by YE02
 - ❖ Mo's Hamburgers
- NTT DoCoMo Mzone
- Softbank Partnership with Denny's, McDonald's, Dutour & Starbuck's Coffee & Orange Food Court in 3,000 Restaurants by 3/03
 - ❖ VoWLAN

Why the Leadership In Asia?

- Falling ARPUs (Vodafone Drops of 13% in Japan & Australia)
- Higher DSL Adoption Rate, Especially in Korea, Singapore, Australia
- More Open to Wireless Data: i-Mode, Arraycomm in Australia
- Almost 50% of WECA Members Are Asian: Samsung, Sony, Sharp, Fujitsu, Toshiba, NEC, Kyocera, Acer, Seiko Epson Corporation, Sumitomo Electric Industries and Yamaha Corporation.

❖ WECA Certification in Taiwan & Singapore

Why the Leadership In Asia?

- Co-Branding w/ Restaurants
- Some Hotels Report 8% Usage Rates
 - ❖ High Cost of Local Phone Call for Dialup (\$1.00/Min). WLAN \$15/Day or \$5.75 for 2 MB
- Roaming Agreements w/iPass and GRIC
- 1,625 hotspots in 2002 Will Grow 38,000 hotspots by 2007
 - ❖ 40% in cafes, 32% in parks, libraries and public buildings, 10% in hotels, and less than 0.2% in airports

Advantages

- Good for the Consumer
- Good for the Service Provider
- Ultimately Single PC Card or Cellular Chip Will Provide Access to Both WWANs and WLANs.

Technology Summary

Technology	Distance	Bandwidth	Application	Advantages	Devices
2.5/2.75G	WWAN	CDMA 1XRTT: 144 Kpbs (avg speed 20-60 kpbs) GPRS: 115 Kpbs (avg speed 30-40 Kbps)	Email with attachments Instant/ Text Messaging Interactive games Digital photography Ring tones Screen savers Gambling	Ubiquitous	Cell phones, PDAs, laptops
3G	WWAN	144K High Mobility 384K Low Mobility 2 Mb Indoor	All of the above+	Ubiquitous High-speed	Cell phones, PDAs, laptops, Consumer devices
UWB	50 Feet	100-500 Mbps	Wireless digital distribution of video & audio in the home-streaming audio/video	High Speed Low power consumption Wide transmission bandwidth =Low Interference	Consumer devices such as digital displays, camcorders, DVDs, digital cameras
Bluetooth	10-m-100 ms	1 Mbps	Cable replacement	'Ad-Hoc' Networking *	Headsets, cell phones, laptops, printers, PDAs



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Specializing in International Wireless, Wireline
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