Technology Standards and Wireless Communications: Introduction

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Standards versus regulations

- Standard: Set of given (technical) specifications
  - "AA" battery size, voltage, etc.
  - Windows®
- Regulation: something (often a standard) that is mandated by law or regulation
  - Length of electrical cord for a refrigerator
  - Frequency range of TV broadcasts

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Major types of standards

- Product (or technology or system)
  - For social reasons: safety, environmental protection
  - For business reasons: interoperability, interchangeability
- Test and measurement
  - Length of the meter
  - Earthquake resistance (covers most cases)
- Process or management
  - ISO 9000, ISO 14000

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Who makes standards?

- Sector-specific standards-setting bodies
  - Professional associations: IEEE, ANSI
  - International standards organizations: ISO, ITU, IEC
- Some government work
  - NIST (National Institute of Standards & Technology)
  - Also participate in negotiations to support free and fair international trade
- The market!
  - Windows®
  - VHS videotapes
  - Blu-Ray versus HD-DVD

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How are standards like IP?

- If your technology becomes a standard:
  - Huge direct impact on product sales
  - Favorable feedback loop: people develop applications for your platform
  - Puts you in a favorable position for the next generation of technology: your standard will influence the direction of R&D
- Standards can exclude competitors from a market
  - SECAM standard for color TV
  - Or, force the use of particular components in a system

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Ownership and access to standards

	Proprietary	Public-owned
Open	JAVA platform (can download specs from web for free)	HTML, TCP/IP
Closed	Windows (you can get the API, but not the source code)	SQL (“published” by ANSI / ISO, but you have to pay to get the specs)

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What are the problems with standards?

- Susceptible to undue influence by existing large companies, national regulators
  - May actually slow down innovation in some cases
- Takes a lot of time/money to keep up with the negotiations, promote acceptance
- Not clear "who's in charge"
  - Requires worldwide understanding of various local conditions

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Why should engineers care?

- In standards wars, the most elegant technology does not always win
- You can waste a lot of time if you develop a new technology for the "wrong" standard
- The process of standardization typically take a lot of time and travel expense
  - But, participation may be essential for a technology-centric company

Wireless Communication Standards: The Situation with China

November 2006

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First: Wireless network businesses

Value-added service providers	News, email, ringtones, games, online shopping…	Various applications companies
Basic service providers	Voice comm, Internet access, stand-alone ntwks	Telecom co's (carriers, operators)
Technology providers	Network	Chips, some SW, equipment (handsets, …)

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Distinctive characteristics of network businesses

- Value-added service (applications) providers
  - Depend on access via telecom companies
  - Need to know about upcoming new techs and standards
- Basic service providers
  - Looking for new higher profit-margin businesses
  - Need to minimize high capital investment costs
  - Still able to delay deployment of new technologies
- Technology providers
  - High cost of R&D -- debugging requires deploying first

The network technology stack

Application/ profiles	Typically user-defined
Application/ framework	Specs of common functional devices for interoperability
Network/comm /security	Routing, topologies, encryption, session mgmt,…
MAC (medium access control)	How nodes transmit; handling simultaneous signals,…
PHY (physical)	Basic transmission scheme, frequencies, node types,…

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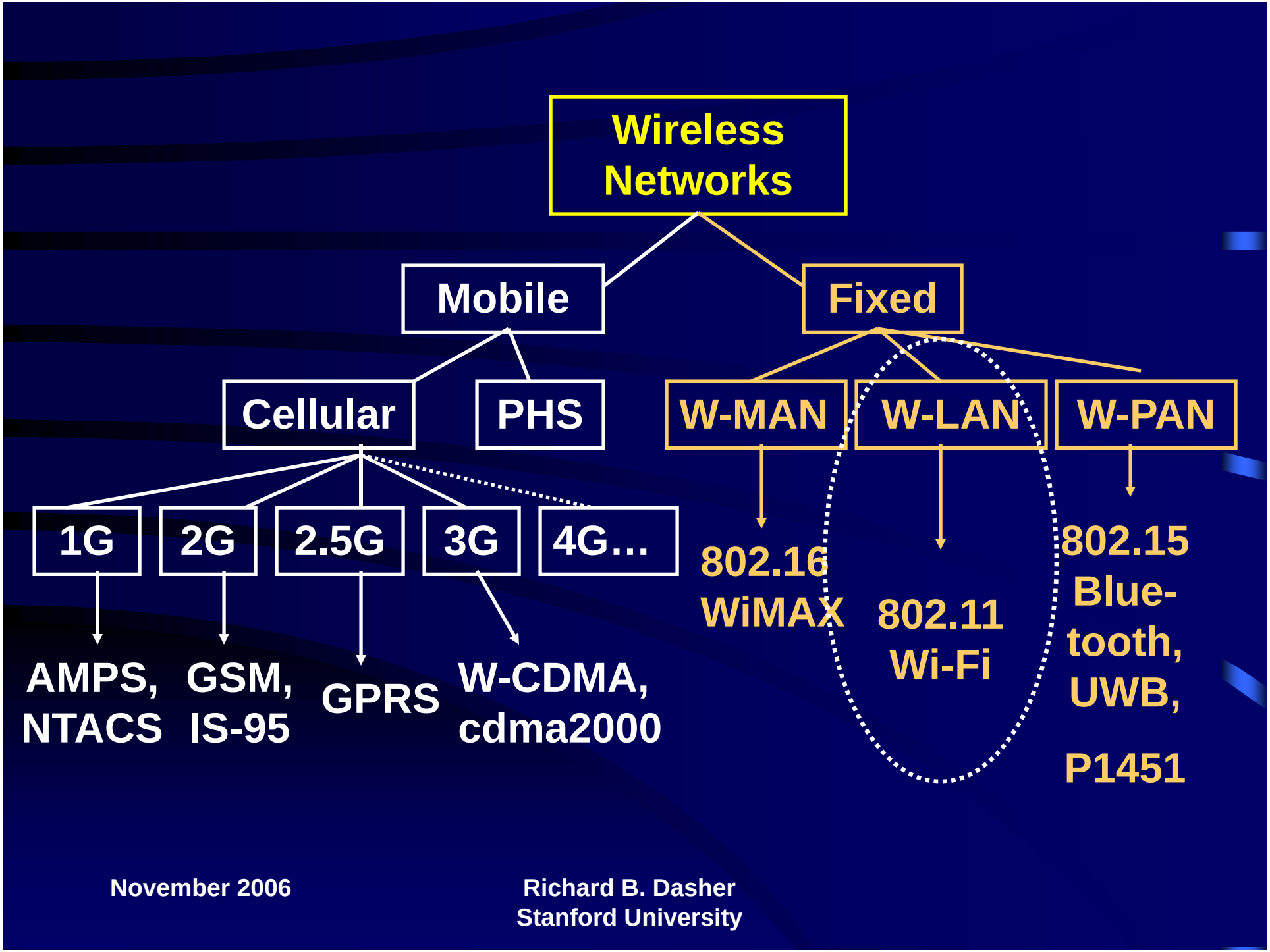

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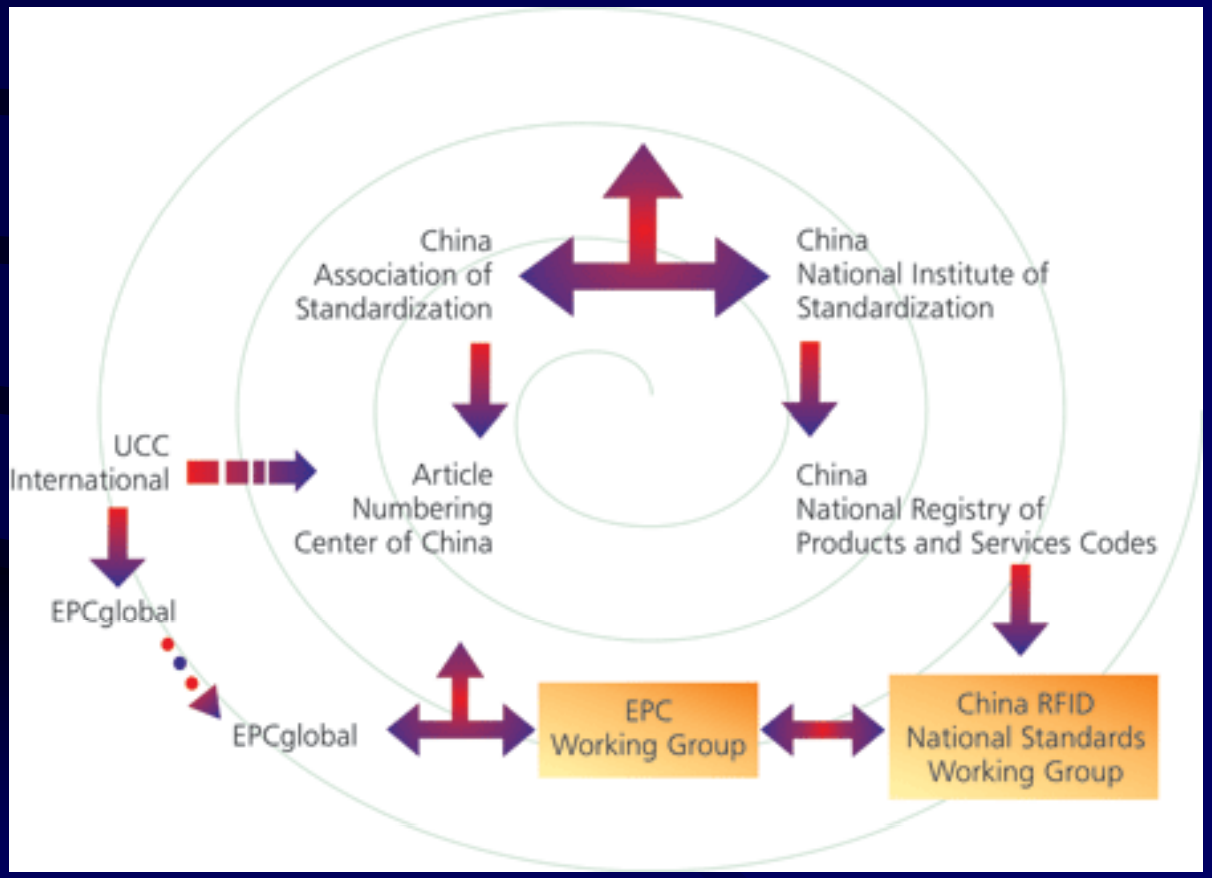
W-LAN standards

- IEEE “802.11” plus suffixed letters for amendments through “w”
  - 802.11a in 5 GHz frequency band
  - 802.11b in 2.4 GHz, with 802.11g increased data rate in 2.4 GHz
  - 802.11i for security
  - Etc. etc.
- Matched by “Wi-Fi Alliance”
  - 200+ member companies
  - Certification program
- Broad acceptance, but China …

The situation with China

- Several major national standards initiatives that may compete with international efforts, e.g.:
  - Software operating systems ("Chinese Linux")
  - RFID ?
  - AVS (compete with MPEG-4 and H.264)
  - 3G mobile cellular (TD-SCDMA)
  - TV to mobile phone (STiMi) (October 26, 2006)
  - WAPI (Wireless authentication & privacy infrastructure) -- versus 802.11i
    - Chinese delegation walked out of ISO meeting in 2005
    - Refused to disclose all WAPI technical specs to ISO

Standards processes in China (example from RFID)



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Evaluation Engineering, Dec. 2004

China and standards (continued)

- China complaint:

  --Have participated in setting only 1% of 16,000 world standards

- Now, to a case study of a standardization issue: WAPI versus 802.11i

  --Next presentation