WINLAB 20th Anniversary Event
Introduction & Agenda Overview

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Introductory Remarks:

Welcome to WINLAB’s 20th Anniversary Celebration!

- A day to thank all our stakeholders to whom we owe our success
- Reflect on the future of wireless with talks from world-leading experts
- And, of course, a good excuse to have a big party!
Introductory Remarks: WINLAB Origins

- WINLAB founded in 1989 with a mission to advance research and education in the field of wireless technology.
- Rutgers one of the first universities to start a wireless research center; Prof. Goodman’s concept was clearly ahead of its time...
- WINLAB true to Rutgers slogan “Jersey roots, global reach”, with the center’s origins in NJ’s long history of industrial R&D on radio
  - Fundamental telecom and wireless innovations at Bell Labs
  - Radio and TV broadcasting, satellite networks at RCA/Sarnoff
  - AT&T, Telcordia (Bellcore), NEC Labs, Thomson and other labs in NJ
- Academic research seeded with expertise from Bell Labs to start, drawing on other NJ research labs (AT&T, NEC, ..) in later years
Introductory Remarks: The WINLAB Difference…

- Factors behind WINLAB’s 20 years of operation as an internationally recognized academic research center
  - Steady focus on wireless, but with enough breadth to cover the field
  - Merging of best practices from academic and industrial research
  - Effective industry collaboration model, keeps research relevant
  - Technology vision and systems concepts shared among faculty
  - Open, collaborative work culture with large “research commons”
  - PhD student research as the foundation for all projects
  - Interaction between theoretical and experimental research groups
  - Investments in research infrastructure, platforms and testbeds
  - Partnerships with other university research groups & research labs
  - And, of course, top-tier academic and industrial research talent
Introductory Remarks: The Wireless Industry – Then and Now

- Wireless was an emerging mass-market technology in 1989, with the cellular industry starting to ramp up
  - 10M cell phones worldwide, 5M in the US
  - Wireless used for several specialized applications – satellite data/TV, point-to-point microwave, emergency, defense, ...

- In 2009, wireless is one of the most important enablers of the communications and IT industries
  - 3.5B cell phones worldwide; mobile operator revenue ~$1 Trillion!
  - Market cap of mobile/wireless companies ~3-4x Internet industry
  - Mobile data growing at 100% CAGR → cellular – Internet convergence
  - WLAN mass market, with >500M WiFi enabled computing devices
  - Cameras, stereos, headsets, sensors, .. with embedded wireless
Introductory Remarks: Wireless Product Timeline
~1989-2009

1980's AMPS phone

2G CDMA Base Station

Personal Base Station

Mobile POS terminal

3G phone

3G data card

3G Netbook

ebook

VSAT

NCR WaveLAN

802.11 Access Point

802.11n MIMO

Sensor Mote

Heart Monitor

Zigbee Meter

DSRC Car Radio

Computing products

Cellular/Voice products

LMDS radio

RFID tag

802.11

NCR WaveLAN

LMDS radio
Introductory Remarks: WINLAB R&D Timeline (sample outputs)

1990

Infostation (2001)

1st Gen SDR (1996)

Multimodal ZnO sensor (2002)

Active RFID (2005)

Packet delivery reliability

Normalized distance of AB

PRMA MAC (1991)

System Analysis For 2G Cellular (~1995)

Dual-radio mesh router (2002)


Extracting secret key from radio channel (2006)

WiNC2R software radio (2008) & Cognitive Networks

Network MIMO Capacity Result (2007)

WiMAX BS (2009)

ORBiT Radio Grid Testbed (2005)

ORBiT automotive node (2007)

ORBiT automotive node (2006)

ORBiT gateway (2007)

Cache-and-Forward Network

ORBiT automotive node (2008)

ORBiT automotive node (2009)

ORBiT automotive node (2010)
Introductory Remarks: WINLAB People

Dipankar Raychaudhuri
Roy Yates
Narayan Mandayam
Chris Rose
Wade Trappe
Predrag Spasojevic
Yanyong Zhang
Marco Gruteser
Ivan Seskar
Yicheng Lu
Zoran Miljanic
Larry Greenstein
Dick Frenkiel
Rich Howard
Richard Martin
Shweta Jain
Sumit Rangwala
Arati Baliga
Melissa Gelfman
Noreen DeCarlo
Janice Campanella
Elaine Connors
Shridatt Sugrim
Khanh Le
JaskaranSingh
~45-PhD & MS Students as of 2009
(see www.winlab.rutgers.edu for photos)
Introductory Remarks: WINLAB

Sponsor Companies

Previous Sponsors ~1989-2009
- Agere
- Agilent
- Ameritech
- AT&T
- BellSouth
- Booz Allen
- Cingular
- Cisco
- CNET
- Comcast
- CONTEL
- CSELT
- Daimler-Benz
- Eastman Kodak
- EPRI
- FCC
- Fujitsu
- GTE
- HP
- Hitachi
- Hughes
- IBM
- ITRON
- Lockheed
- MA/Com
- McCaw
- Mitre
- Mitsubishi
- Motorola
- NEXTEL
- Nokia
- Nortel
- NTT Data
- NYNEX
- Pactel
- SBC
- Sony
- Sprint
- Telcordia
- Telia
- Toshiba
- United Telecom
- US West

Current Sponsors (2009)
- Panasonic
- Infosys
- Intel
- THOMSON
- NEC
- TOYOTA
- InterDigital
- CDMA
- docomo
- Sony
- SPRINT
- Panasonic
- Qualcomm
- Alcatel-Lucent
- Ericsson
- Rutgers
- WINLAB
Introductory Remarks: The Road Ahead

- Many years to go before wireless becomes a mature field
  - Mobile Internet a huge business opportunity along with research challenges – scale, architecture, services, …
  - Major new opportunities in pervasive and M2M applications, with wireless as the “glue” for integrating physical and virtual worlds
- Our challenge is to keep WINLAB’s research agenda fresh and relevant as we enter our 20’s….
  - Fundamental communications/information theoretic challenges
  - Enabling technologies and architectures for wireless networking
  - New mobility and pervasive applications
- Next, for the main event, we hear from our distinguished speakers on the future of wireless technology
WINLAB 20th Anniversary Event: Agenda Overview

Welcome to WINLAB's 20th Anniversary Event

- Open House Posters & Demos – 10AM to noon
- Distinguished Speaker Seminar on “The Future of Wireless Technology” – 1:30-4:45PM
- Speakers Panel and Audience Q&A – 4:45-5:30
- Brief address by Rutgers President, Dr. Richard McCormick – 5:30
- Reception – 6:00 to 7:00PM
- Celebration Dinner – 7:00 to 9:00PM
WINLAB 20th Anniversary Event: Seminar & Panel Details

- Distinguished Speaker Talks (Moderator: Yanyong Zhang)
  - David Goodman, Professor, NYU Poly & Founding Director, WINLAB
  - Vincent Poor, Dean, School of Engineering, Princeton U
  - Andrea Goldsmith, Professor, Stanford U
  - Victor Bahl, Manager - Networking, Microsoft Research
  - Henning Schulzrinne, Professor, Columbia U
  - Kazuo Imai, CEO, DoCoMo Laboratories, USA

- Speaker Panel (Moderator: Narayan Mandayam)
  - Further discussion on future trends and audience Q&A