

Strategic Plan Update

IAB/Research Review

May 20/21, 2002



Rutgers University

www.winlab.rutgers.edu

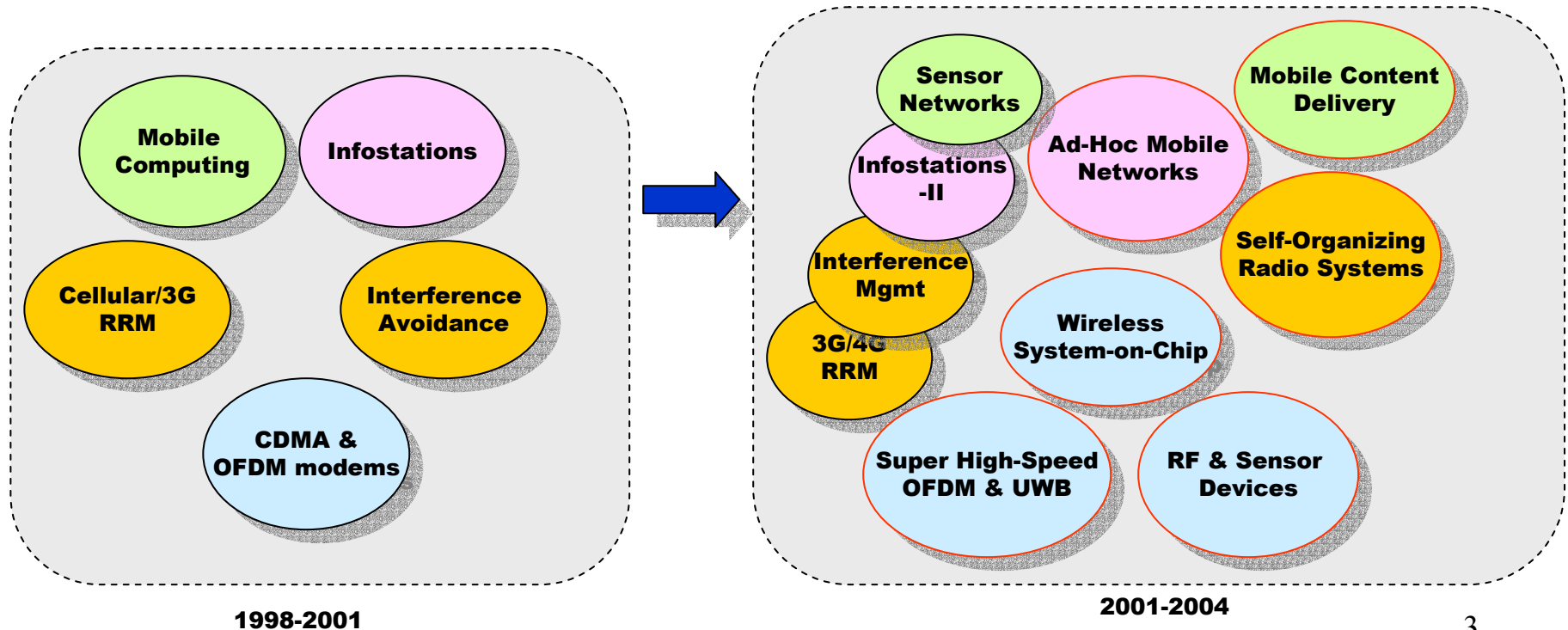
Contact: Prof. D. Raychaudhuri, Director
ray@winlab.rutgers.edu

IAB Introduction

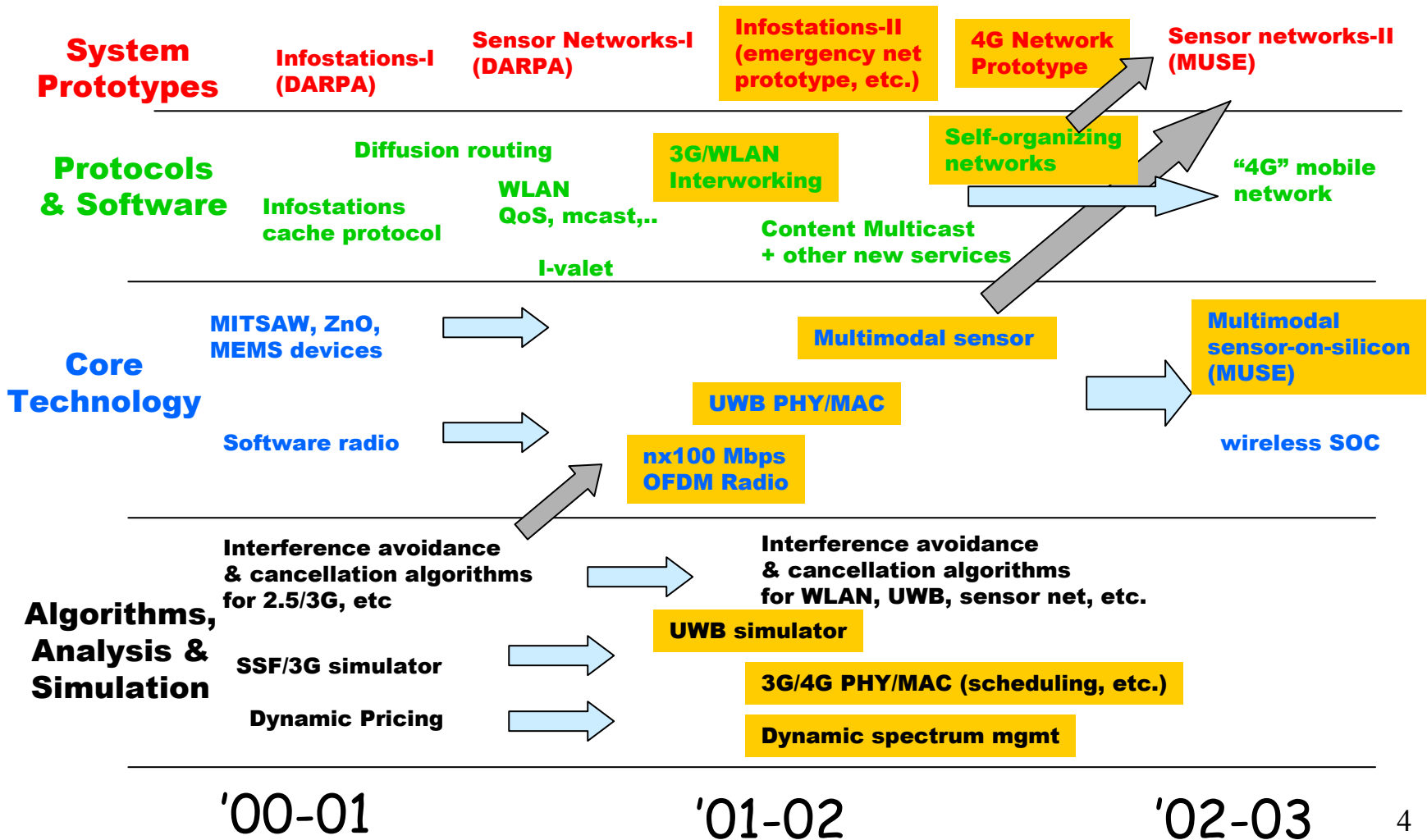
- WINLAB welcomes attendees of our Spring 2002 IAB Meeting
- The purpose of the IAB is to inform sponsors about our projects on core research, focus projects, and WINLAB infrastructure
- At the last IAB, we presented a strategic plan for expanding the center's research scope & resources
- The agenda for this session will be as follows:
 - Recap of core research activity & results
 - Update on status of focus projects
 - Progress report on strategic plan
 - Issues & opportunities for sponsors to consider
 - Feedback session

IAB Introduction: WINLAB's Research Direction

- Migration from 2G/3G cellular data networks towards the vision of a more heterogeneous, scalable and self-organizing mobile Internet...
- Increasing use of experimental methods and hardware/software prototypes...



IAB Introduction: WINLAB R&D Map



IAB Introduction: Core Research Areas

Basic
Radio/
Modem
Technology

- RF & sensor devices, high-speed modems & wireless SoC design/test

Radio
Resource
Management
& Wireless
Systems

- RRM & interference issues in 3G and WLAN systems, migrating to heterogeneous and ad-hoc radio

Mobile
Network
Architecture
& Protocols

- Hierarchical, self-organizing wireless networks for WLAN+, sensors and future 4G

Mobile
Computing
Middleware &
Applications

- Sensor network applications and context-aware mobile apps, migrating to pervasive computing

IAB Introduction: Core Research Projects

Basic Radio/Modem Technology

Radio Modem/MAC
-OFDM, UWB, etc

Interference cancellers

Software radio testbed

RF/MEMS/sensor devices

Wireless system-on-chip

Radio Resource Management & Wireless Systems

Interference avoidance

3G & UWB simulations

Pricing Models

Dynamic spectrum mgmt

Mobile Network Architecture & Protocols

WLAN+ protocols

WLAN/3G interworking

Open-arch mobile net

Content caching,
multicast,..

Self-organizing, ad-hoc
network protocols

Mobile Computing Middleware & Applications

Infostations protocols

Sensor networks

I-valet (context aware
applications)

Pervasive computing
security & applications

IAB Update: Focus Project Status

- Several focus projects under way, including 3 initiatives started during AY'02-'03
- Most involve partnerships, multidisciplinary research

ongoing projects

- FreeBits (...NSF ITR project, '00-'02)
- NJ Center for Wireless Comm (NJCST project, '01-'03)

recently awarded

- Dynamic spectrum management (NSF ITR project, '02-)
 - partnership with Michigan State & Cornell
 - focus on fundamentals of unlicensed spectrum sharing
 - includes experimental work on radio etiquette

IAB Update: Focus Project Status (cont.)

- Two major pending focus project proposals (~\$5M each)
- Multimodal Sensor-on-Silicon: MUSE (NJCST finalist)
 - strong reviews in first round of evaluation -> validated by strong business projections for wireless sensor market
 - final NJ Center-of-Excellence proposal submitted 3/02, now in review (~7-8/14 to be awarded at this stage)
 - significant cost-sharing from RU, UMDNJ & companies involved
- Ultra Wideband (UWB) Radio (Intel, DARPA..)
 - submitted to DARPA's NETEX program in Fall '01
 - collaborative project with Intel Research, UCSD & U Washington
 - final proposal invited 11/01 - reviewed as "selectable", but NETEX program funding in doubt
 - considering next step, including alternative Govt funding & corporate consortia models....

IAB Update: New Faculty/Staff

- Several key faculty and research appointments during this period (10/01-5/02):
- Prof. Mike Bushnell
 - ECE faculty member with world-class VLSI research program
- Dr. Larry Greenstein (...formerly with AT&T)
 - Internationally renowned expert on radio propagation
- Dr. Max Ott (...on part-time leave from Semandex)
 - Expert on distributed systems/networking
- Dr. Leo Razoumov (...formerly with Qualcomm)
 - Senior researcher with expertise on high-speed data in 3G
- Dr. Kemal Tepe (...formerly with Telcordia)
 - Research experience in WLAN security

IAB Update: New Faculty/Staff (contd.)

- Several adjunct appointments as well during this period (10/01-5/02):
 - Dr. Paul Henry (AT&T Labs)
 - wireless and optical device technologies
 - Dr. Binay Sugla (ISPSOft)
 - network management software, new ventures
 - Dr. Sudhir Aggarwal (Lucent Bell Labs)
 - networking and distributed systems
 - Dr. Chang-Wen Chen (Sarnoff)
 - MPEG, wireless video

- 1-2 new academic faculty expected to start in Fall '02
 - priority areas: networking & wireless system-on-chip

IAB Update: Faculty/Staff

Basic
Radio/
Modem
Technology

Radio
Resource
Management
& Wireless
Systems

Mobile
Network
Architecture
& Protocols

Mobile
Computing
Middleware &
Applications

Faculty:

Y. Lu
M. Bushnell
J. Evans
P. Spasojevic
L. Greenstein
R. Rangarajan
(Res Engr)

J. Lin*
P. Henry*

R. Yates
C. Rose
N. Mandayam
S. Mau (Post-Doc)
D. Frenkiel
Z. Gajic
L. Razoumov
(Res Scientist)

D. Raychaudhuri
K. Tepe (Post-Doc)
I. Seskar (Assoc Dir IT)
M. Ott%
K. Wine (Res Engr)
S. Mathur (Res Engr, to 5/02)

D. Reininger*
B. Sugla*

W. Trappe
(Asst Prof, starts 7/02)

B.R. Badrinath
T. Imielinski
H. Hirsh

C-W. Chen*
S. Aggarwal*

*Adjunct Prof
% part-time visiting faculty

IAB Update: New Labs

- WINLAB is in the process of establishing two new labs:

lab currently operational

- Mobile Networks (MobiNets) Lab, CORE Bldg 5th floor
 - Linux-based open-architecture routers, access points, forwarding nodes, sensor nodes, etc.
 - Projects on WLAN enhancements, self-organizing network protocols, Infostations caching, mobile content delivery,...

lab under development

- Sensor-on-Silicon (MUSE) Lab, CORE Bldg 5th floor
 - ZnO device testing, RF/MEMS components, mixed-signal design/test, low-power design,..
 - First system project aimed at MUSE chip prototype with ZnO-based sensor/RF & low-power 802.11b-

IAB Update: Sponsor Program

- Two new sponsors with strategic roles in the wireless industry joined WINLAB recently
 - Intel Research
 - Agere Systems
- Currently engaged in discuss with ~4-5 other potential sponsors in US, Europe and Asia
- *The center had ~2-3 departures in '02-'03 due to mainly to R&D cutbacks at major telecom companies...*

IAB Update: Sponsor Program (cont.)

- Working towards closer engagement with several sponsor companies, either as part of new full-sponsor model or as focus project
 - UWB collaboration with Intel Research
 - 3G/WLAN with Thomson Multimedia
 - 3G/4G system optimization with NTT DoCoMo
 - hardware-design internships & MEMS proposal with Lucent
 - next-gen WLAN technologies with Agere
 - etc.

...additional collaborations welcomed, either for funded projects or joint proposals

IAB Update: Tech Transfer

- Working to improve WINLAB's tech transfer capabilities:
 - better electronic publishing of tech reports, etc.
 - more prototyping projects with software or hardware designs as deliverable
 - research "work packages" for sponsor use
 - more joint work with sponsor research staff
 - student internships (...need your help with this!)
- Currently working on a demo and tech transfer package for Infostations-based emergency network, based on Govt and sponsor interest...

IAB Update: **Senior Advisory Board**

- A Senior Advisory Board (SAB) has been established effective 4/02 to provide additional guidance on WINLAB's research strategy, feedback on execution, and help with identifying external needs/opportunities:
 - Very distinguished panel of ~5-7 industry leaders with particular interest in new technology & R&D
 - First meeting on 5/21 after IAB
 - Names of SAB members TBA shortly

IAB Meeting Feedback

- Feedback, comments, ideas for improving WINLAB's program welcomed from sponsor community....
 - *contact me or any of our faculty!*
 - *we are prepared to schedule follow-up visits to sponsors to discuss in greater depth*

SAB: Issues & Questions

- Research strategy: any important topics that we're missing?
- Steps needed for research to be at par with top-tier Univ centers, e.g. UCB, CMU, UCLA?
- How to retain and attract new corporate sponsors under current market conditions
- What constitutes a compelling "value proposition" for sponsored Univ research in an environment of R&D cutbacks?
- Suggestions for sponsor companies outside the current WINLAB pool of telecom & semiconductor companies?

SAB: Issues & Questions (cont.)

- Are there any large Govt (e.g. DARPA, NIST) research initiatives we should participate in?
- Potential multi-organization or multi-disciplinary "large" Govt programs?
- Should we try to influence wireless R&D investment at a national level? (...compare with EU, where ~\$100M Euro allocated to wireless alone)
- Membership in World Wireless Research Forum & strategy for 4G?
- How to improve tech transfer?
- Comments on working with VC's on an early stage incubator at Rutgers?