

# WINLAB Strategic Plan IAB/Research Review Oct 29 & 30, 2001



Rutgers University

[www.winlab.rutgers.edu](http://www.winlab.rutgers.edu)

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# Wireless Information Network Laboratory

- Cooperative industry-university research center at Rutgers University, focused on wireless technology
- In operation since 1989, with a strong track record of research contributions to wireless data networking
- Research program a mix of core R&D, focus projects and industry collaboration
- ~20+ Industry sponsors, NSF, State of NJ, ...
- ~20 faculty/staff + ~30-50 students
  
- *Strategic Plan initiated in Sept '01 to take WINLAB to the next level in terms of:*
  - *scope, quality, volume of work*
  - *impact on field*
  - *value to sponsors*

# Strategic Plan Talk Outline

Discussion of specific steps being executed to strengthen WINLAB research program

- Increased research scope
  - *Modem technology, wireless system-on-chip*
- Growing faculty & areas of expertise
  - *New academic faculty, adjunct Research Prof program*
- New labs & experimental work culture
  - *Mobile networks, wireless devices/chip design*
- Revamped sponsor program
  - *More engagement, assigned student, bilateral projects, updated IPR model*
- Strategic "Focus Projects" for govt funding with corporate partnership
  - *Multimodal sensor-on-silicon (MUSE), UWB, etc.*
- Proactive role in tech transfer
  - *NJ R&D Excellence program, tech transfer center/incubator (future),..*

# Increased Research Scope

- Two new core research areas
  - *RF/Modem/MAC technology & SOC*
  - *Mobile network protocols & software*
- Rounds out pre-existing areas of research strength
  - *Radio resource management*
  - *Mobile computing*

# Increased Research Scope (contd.): Core Areas

*new area*

Basic  
Radio/  
Modem  
Technology

Radio Modem/MAC  
-OFDM, UWB, etc

Interference cancellers

Software radio testbed

RF/MEMS/sensor devices

Wireless system-on-chip

*existing WINLAB strength*

Radio  
Resource  
Management  
& Wireless  
Systems

Interference avoidance

SSF simulation models

Pricing Models

Dynamic spectrum mgmt

*new area*

Mobile  
Network  
Architecture  
& Protocols

WLAN+ protocols

WLAN/3G interworking

Open-arch mobile net

Content caching,  
multicast, ..

*existing WINLAB strength*

Mobile  
Computing  
Middleware &  
Applications

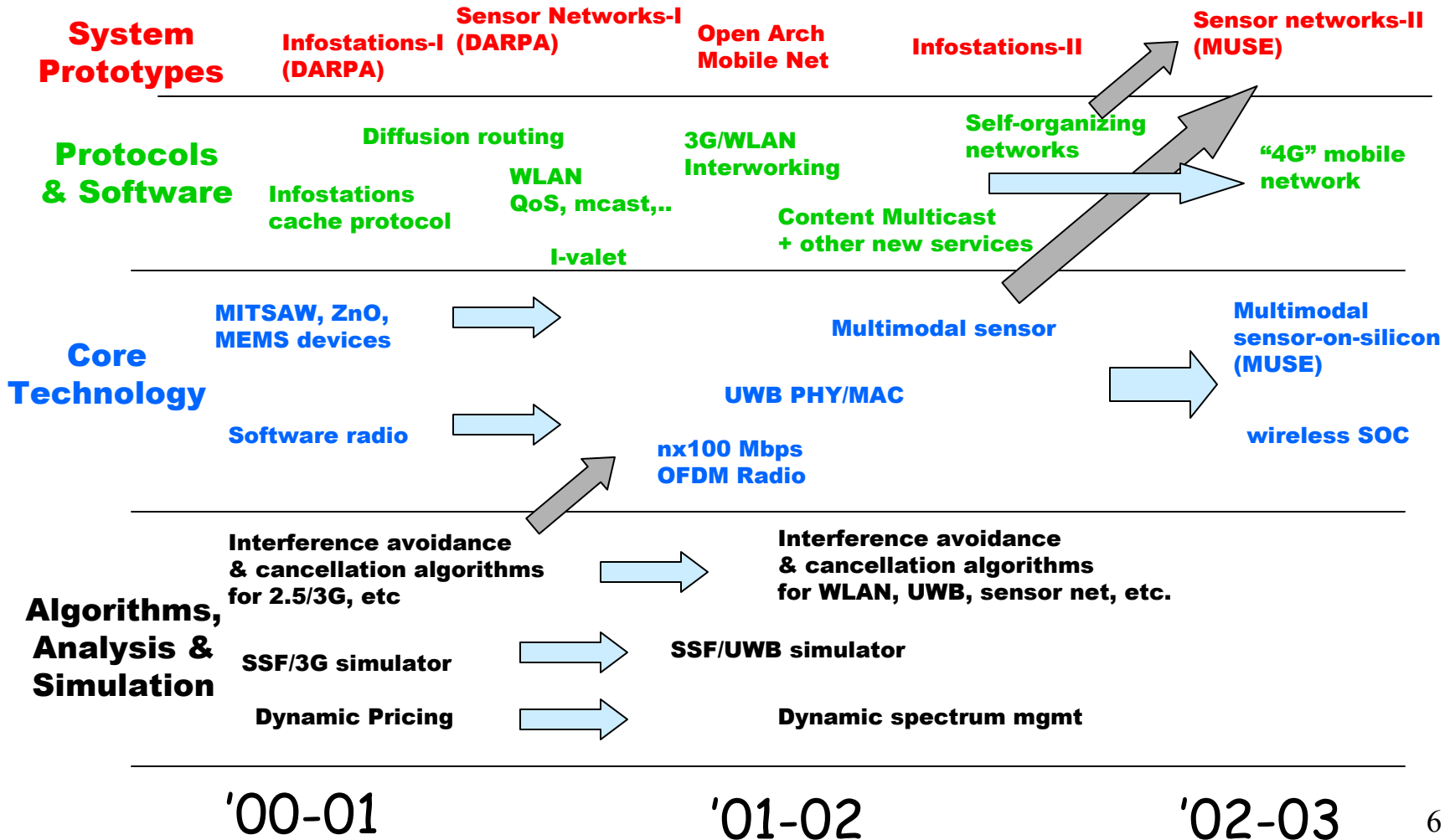
Infostations protocols

Sensor networks

DATAMAN

I-valet (context aware  
applications)

# Increased Research Scope (contd.): R&D Map



# Faculty Growth

- Major resource commitment from Rutgers School of Engineering
  - *Several new faculty lines for WINLAB/ECE*
  - *+2 in Fall '01, ~+2-3 in 2002*
- Inviting ECE & CS faculty with synergistic expertise to join WINLAB
  - *ongoing process, Prof. Y. Lu (SOC), Prof. Z. Gajic (RRM)*
- Active adjunct faculty program to tap into outstanding NJ expertise in wireless tech & to create 2-way info flows
  - *~4-5 new appointments in Fall '01, more to come*
  - *complementary expertise such a networking, SOC*

# Faculty Growth (contd.)

Basic  
Radio/  
Modem  
Technology

Radio  
Resource  
Management  
& Wireless  
Systems

Mobile  
Network  
Architecture  
& Protocols

Mobile  
Computing  
Middleware &  
Applications

## Faculty:

Y. Lu

J. Evans

P. Spasojevic

L. Greenstein\* (Adjunct)

J. Lin\*

...+ 1 TBH

R. Yates

C. Rose

N. Mandayam

S. Mau (Post-Doc)

D. Frenkiel

Z. Gajic

D. Raychaudhuri

I. Seskar (Res Eng.)

P. Bhagwat\*

M. Ott\*

D. Reininger\*

...+ 2 TBH

B.R. Badrinath

T. Imielinski

H. Hirsh

+ new CS faculty TBD

\*Adjunct Prof

\*new faculty in red



# New Lab Facilities

- Two new labs being established at WINLAB during AY'01-02
  - *Mobile network lab*
  - *Wireless device and system-on-chip lab*
- Adds to existing labs for:
  - *Wireless system simulation*
  - *Radio/modem lab*
- Develop an experimental work culture with PhD quality research output
  - *VHDL training, etc (...with help from sponsors)*
  - *Software projects & open-arch methodology*

# Revamped Sponsor Program

- New sponsor program intended to increase sponsor engagement and deliver more value
- Revised sponsor fees
  - *Increased full member dues to \$70K to bring WINLAB to "market level" for similar centers*
  - *\$30K fee set in 1989 and has not changed since!*
  - *Realistic pricing necessary to ensure that center has the resources to meet sponsor expectations*
  - *WINLAB will leverage sponsor \$ to get significantly larger RU & govt funds & thus more results*

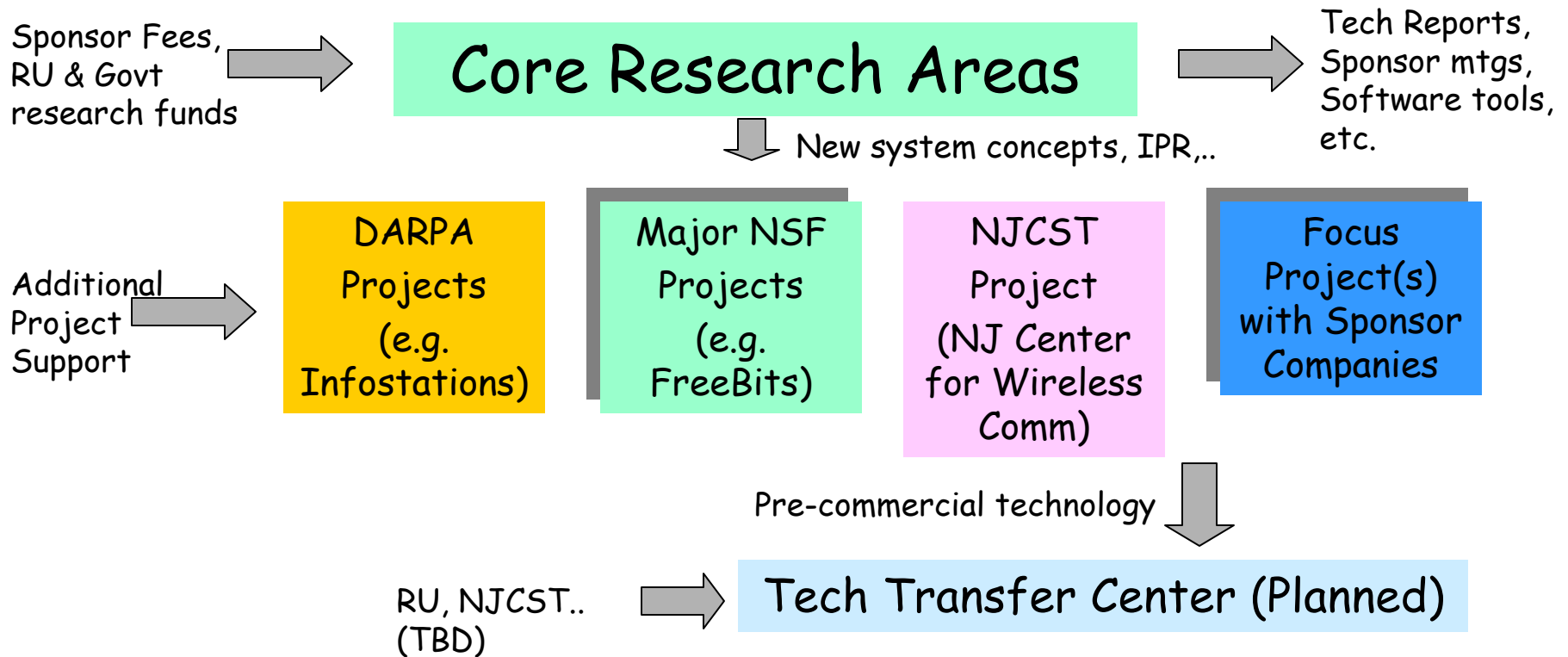
# Revamped Sponsor Program

- Increased benefits & engagement
  - *larger & stronger core research program*
  - *assignment of a grad student to mutually agreed research topic with each sponsor*
  - *optional "focus project" model for joint work with one or more sponsors*
  - *inviting collaboration on large Govt programs*
- Updated IPR model
  - *Full access to "common pool" (core research) IPR*
  - *Research use access to DARPA, NSF funded results*
  - *Case-by-case IPR agreements for "focus projects"*

# Focus Projects

- Focus Projects are larger and more high-impact research efforts, including:
  - key wireless technologies (design-to-chip/software)
  - proof-of-concept prototyping of new wireless systems
  - multidisciplinary activities involving other RU Depts, other Univ's and companies
  - goal-oriented joint projects with companies
- Funding from:
  - large Govt programs (NSF ITR, DARPA, NJCST,...)
  - corporate partners, typically at seed-stage

# WINLAB Operating Model: Role of Focus Projects



# Focus Projects (contd.)

- Infostations (DARPA, '98-'01)
  - Multi-disciplinary system project involving several CS & ECE faculty (completed)
- FreeBits (NSF, '00-'02)
  - Collaborative program (with Princeton & NJIT) on ultra high-speed modem design (ongoing)
- NJ Center for Wireless Communications ('00-)
  - State-funded center-of-excellence involving Rutgers, Princeton, NJIT and Stevens (ongoing)
- Several new focus projects (UWB, MobNet, Sensor-on-Silicon, dynamic spectrum mgmt) being scoped with govt agencies and sponsors<sup>14</sup>

# Technology Transfer

- Tech transfer process being improved
  - *More two-way information flow with sponsor companies (...assigned project, focus projects, joint proposals, etc.)*
  - *More useable technology cores ("packages", hardware designs, software, ..)*
  - *Research visitors, student interns, etc.*
  - *Work closely with sponsors to establish labs and training programs (e.g. SOC)*

# Technology Transfer (contd.)

- Tech transfer improvements:
  - *Participation of industry experts, adjuncts,.. ("Senior Advisory Board" being seated by 12/01)*
  - *State-level initiatives for technology outreach (NJCWT, others) working with sponsors*
  - *Technology transfer center/incubator with RU Business school (...planning for proposal in '02)*



# Strategic Plan 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*