LAWN
Local Area Wireless Network

DCIS/LCSR
Wireless Zone

This area has wireless coverage using an 802.11b (Wi-Fi) network.

http://please.rutgers.edu/show/wireless
wireless@dcis.rutgers.edu

Laboratory for Computer Science Research
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LAWN Environment
http://please.rutgers.edu/show/wireless/

• Wireless coverage plus managed DHCP
• In operation for four years
  – deployed in April of 2001
• 90,000 sq ft coverage
  – Covers all floors in Hill and CoRE
  – 40 access points,
  – 1,150 unique users in 2004
    • 1,450 different MAC addresses
    • 28,150 sessions
Usage of LAWN

24 Hours LAWN-GW Total Incoming Traffic

- External download: Current: 2527 MB, Avg: 2447 MB, Max: 5212 MB
- RU download: Current: 988 MB, Avg: 594 MB, Max: 656 MB
- LCSR download: Current: 5 MB, Avg: 552 MB, Max: 2578 MB
- TopTalker Boundary

24 Hours LAWN-GW Total Outgoing Traffic

- RU upload: Current: 51 MB, Avg: 57 MB, Max: 225 MB
- LCSR upload: Current: 12 MB, Avg: 239 MB, Max: 1795 MB
- TopTalker Boundary

24 Hours Wireless Authentication Stats

- Auto logins: Current: 1, Avg: 10, Max: 26
- Roaming logins: Current: 9, Avg: 22, Max: 55
- Unique users: Current: 45, Avg: 77, Max: 135
- Unique machine: Current: 47, Avg: 88, Max: 150
- Active users: Current: 7, Avg: 18, Max: 57
LAWN
Design Goals

• Designed for a university environment
  – Federated control
    • Authenticate against trusted servers
  – Environment must coexist with wireless research
    • 5 cooperating overlapping 802.11b networks
  – Easy access for visitors and collaborators
    • Workshops, conferences, etc.
  – SNR of 60 or better
  – Handles wired and wireless identically
    • Wired provides better bandwidth
    • Wired eliminates RF interference
LAWN
Design Decisions

• Usage
  – Allow encryption but don’t require it
  – Monitor on a per user per destination basis
    • Based on user ID, not IP or MAC address
    • Record end-to-end traffic patterns
      – within wireless, to DCS, to RU, to Internet
  – Usage above 1GB a day dealt with in person
    • 1-2 a month, no repeat offenders
  – 1 MB throttle considered but not adopted
    • Fewer than 10 users on an AP at any given time
LAWN
Why use Federated Control

• Authenticators may need to be different
  – A grants access only to A’s student/staff
  – B grants access only to B’s student/staff
  – C grants access to both A’s and B’s student/staff

• A variety of clients are handled
  – WINxxx, XP, OS9, OSX, Linux
  – PDAs (e.g., IPAQ, WinCE)
  – Sony Robotic Dogs, NSF GPS research
LAWN
Distributed Authentication

• All authentication transactions are secure
  – Identify yourself and your authentication server
  – Provide password

• User is authenticated against the selected authentication server

• Works well for collaborators and vendors
  – they use their own VPN
  – they access their own resources
LAWN Equipment Costs

• 80% of our equipment costs are access points
  – 802.11b or 802.11b/g with POE(802.3AF)
  – 802.11a for dedicated access
  – $200 each

• A single gateway/firewall supports a building-cluster
  – Handles bandwidth from all APs (400MHz PII)
  – Reuse retired equipment, $1000 for rack mounted

• Several gateways share one authenticator
  – Only used during authentication – lightly loaded
  – Reuse retired equipment, $1000 for rack mounted
LAWN Operation Costs

• Cost effective operations
  – Faulty access points
    • 2% of an FTE  1 hour per week
  – Unannounced research networks
    • 1% of an FTE  30 minutes per week
  – Software maintenance and upgrades
    • < 1% of an FTE  ~ 1 hour per month

• Installations
  – Multistory buildings vs. single story
LAWN
Cross Channel Interference

- 1,6,11 deployment (separation of 5)
- 1,4,8,11 deployment (separation of 3, 4, 3)
Lawn Summary
http://please.rutgers.edu/show/wireless/

- Based on trusted distributed authenticators
- Visitors and collaborators are first class citizens
- Security is user’s responsibility
- 15% of LAWN users logged in at any given time
- Equipment cost is dominated by access points
- Operational cost is dominated by access points
Wireless at RU - 2010 and beyond

- Are publicly available wired-machines in RU’s future?
- Should print stations be collocated with wireless environments?
- Should wireless environments support PDAs and cells phones?
Wireless at RU - 2010 and beyond

• How should RUs prioritize wireless environments?
  – Public buildings, student residences, classrooms, academic and staff offices, outdoor spaces?

• What wireless services should be provided?
  – Wired services repurposed for wireless devices?
  – Inherently wireless (i.e., location dependent) services?
    • Where is the nearest print station?
    • How do I get to x from where am I now?