

[**So, do you know**
the language
of ICT?]

TNC 2003

Wireless Campus project



ICT innovation

[*Agenda*]

- Wireless Campus network
- Security
- User mobility
- Services
- Open Source



[Agenda]

➤ Wireless Campus network

➤ Security

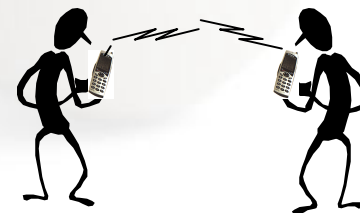
➤ User mobility

➤ Services

➤ Open Source

[*Wireless Campus project*]

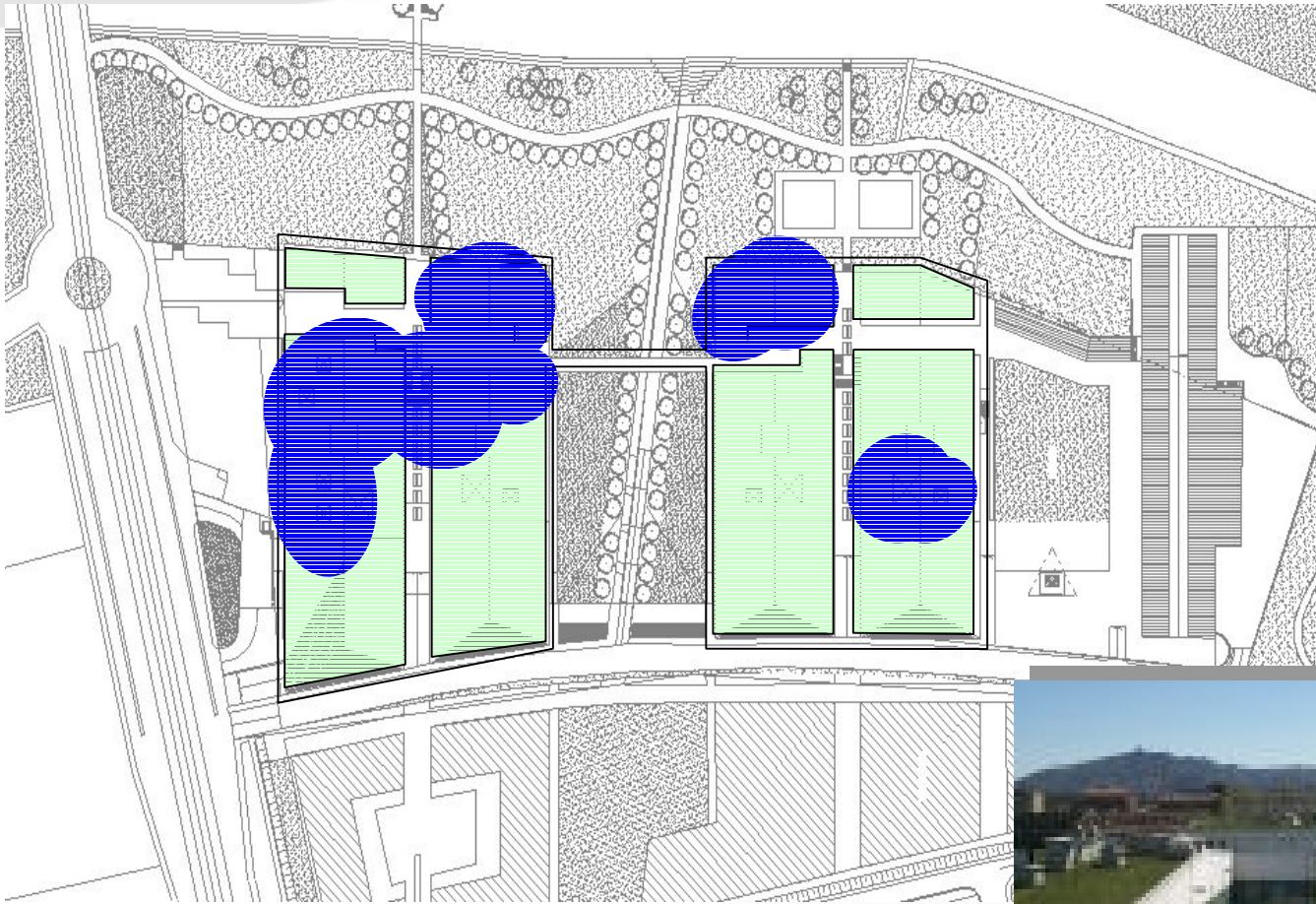
- Actors
 - CSP: Italian ICT research centre
 - Environment Park: Technology Park
- The main idea is realizing a WLAN network as
 - Real test-bed for research activities on WLAN technologies
 - Experimental field for end-user services to prototype after R&D results
- Why Technology Park
 - Competence dissemination
 - Promote the adoption of wireless technologies among local communities and enterprises (SMEs, PA)
- Key issues
 - State-of-the-art technology
 - Multiple service scenarios



[*The network*]

- Technology is 802.11b compliant
- Architecture includes
 - Access points + centralized management server for network infrastructure
 - Security servers
 - Add-on services devices (e.g. e-mail, multimedia, ecc.)
- Two phases for network deployment
 - Phase 1
Access points, management server, security servers and base services activation
 - Phase 2
Advanced services and coverage extension plan according to Phase1 results

[RF coverage]



 RF signal



Architecture

WLAN access network

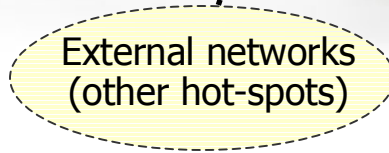
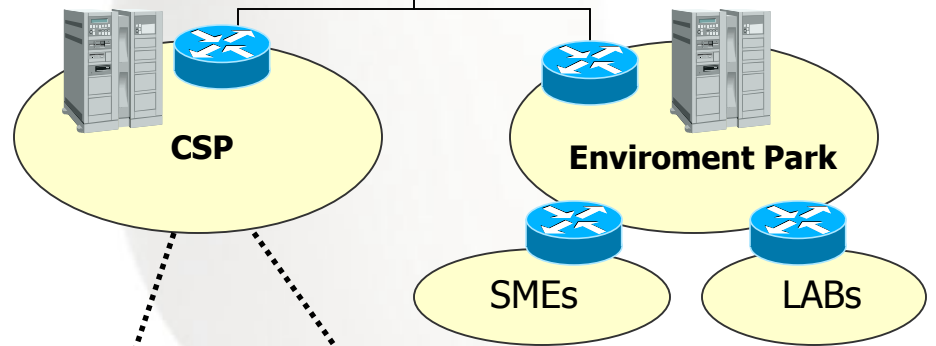
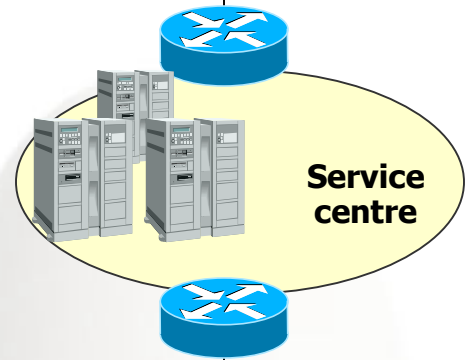
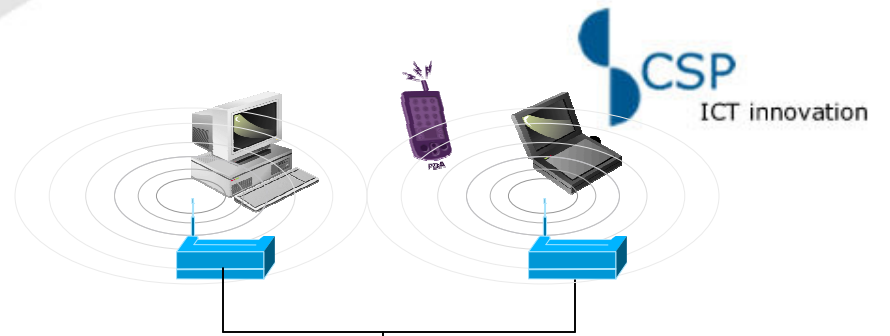
WLAN management

Security

Shared services

Intranet services

Wireless Campus extensions



[*Services*]

- Basic
 - E-mail
 - Web navigation – redirection to specific web pages to promote initiatives and locate offices in the park
 - Intranet access
- Advanced
 - Video-surveillance from wireless webcams
 - Instant messaging
 - Presence services
 - Streaming (radio, video)

[*Issues*]

- A single network infrastructure providing
 - Dedicated network access for some entities
 - Shared environment in common places
- Services
 - Targeted to different types of terminals (PDA, laptop, PC)
 - Tailored on the user privileges (web access, intranet resources availability)
- Challenges
 - User mobility
 - Security
 - QoS
 - Interoperability

[Agenda]

➤ Wireless Campus network

➤ **Security**

➤ User mobility

➤ Services

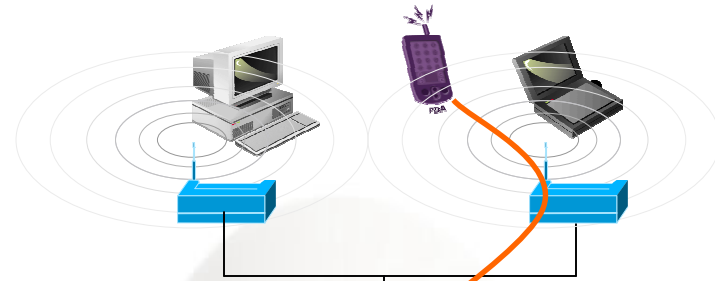
➤ Open Source

[*Security*]

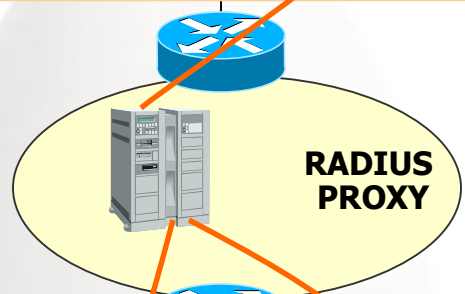
- WEP
 - Well known WEP vulnerabilities
 - Just consider wardriving...
- 802.1x to provide
 - strong and mutual authentication between users and WLAN elements
 - access control and key management
- Wireless Campus
 - actually with 802.1x clients on terminals
 - later using Aps as clients towards RADIUS server

[Authentication]

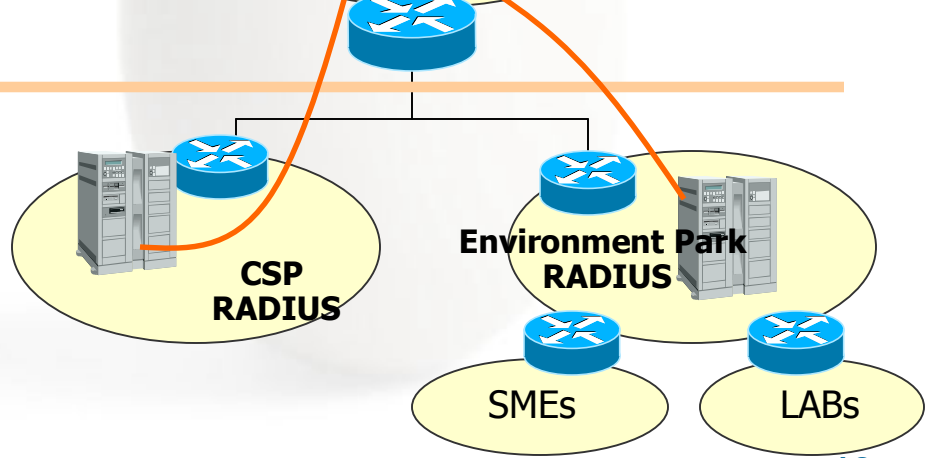
WLAN access network



Authentication management



Local Authentication



[Agenda]

➤ Wireless Campus network

➤ Security

➤ **User mobility**

➤ Services

➤ Open Source

[*Mobility*]

- From network perspective
 - mobility among AP on the same WLAN
 - seamless handover
 - mobility among different WLAN
 - planning to deploy Mobile IPv4 on some areas
 - LAB activity on Mobile IPv6
- From service perspective
 - Studies about user localization on WLAN
 - Location Based Services



[*User Localisation*]

- CSP and Politecnico of Turin cooperate investigating on WLAN mobile user localization techniques
 - Currently indoor coverage of WLAN can provide information about user location on AP “Cell-id” : each access point is associated with a section of the building
 - Poor accuracy
 - Localization can improve if the user is heard by a set of beacons, then triangulation techniques can be used
 - Hybrid solutions can be found combining different pieces of information available for the communication interface

[*WLAN and GPRS*]

- At present
 - 802.11b client cards provided with SIM slot for GPRS connectivity
 - Users can connect through WLAN under Wireless Campus hot-spot coverage and through GPRS when away
- Next step: WLAN network connection to GPRS operator network
 - User moves out of WLAN coverage and keeps connected to Wireless Campus through GPRS
 - Testing of WLAN-GPRS roaming features
 - Authentication
 - Services

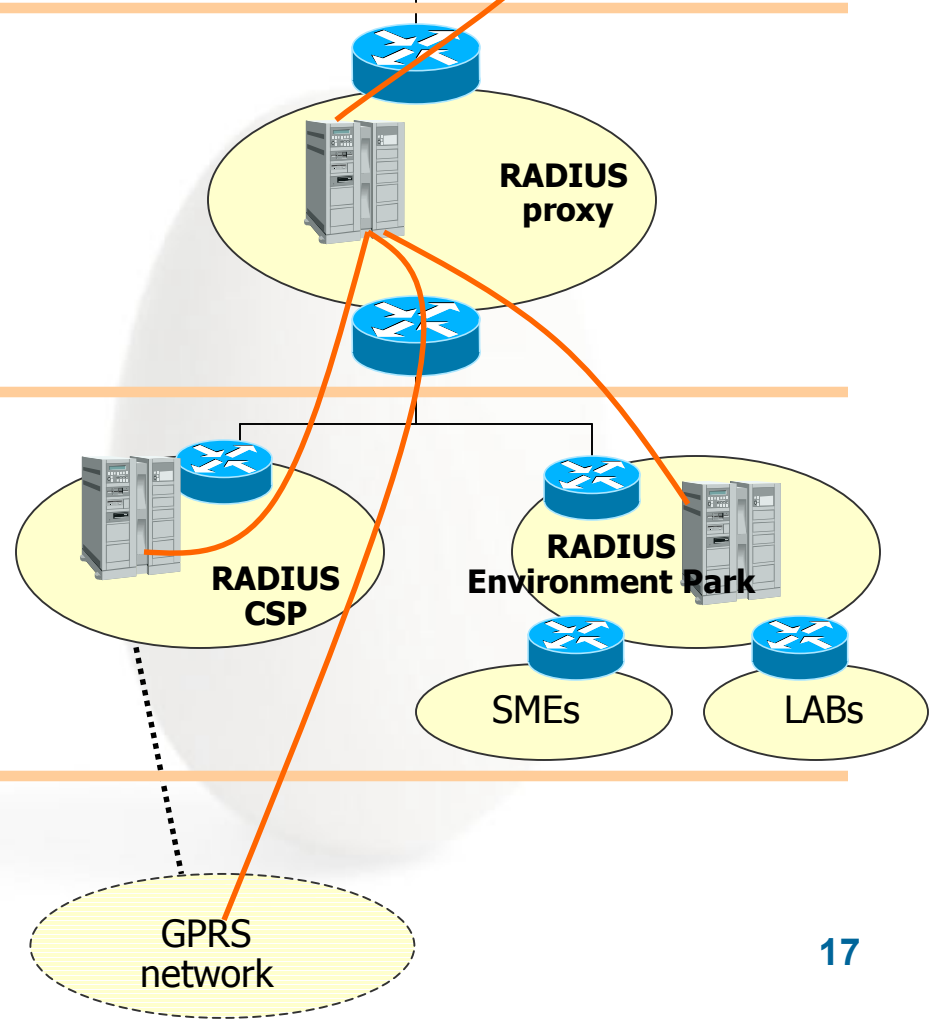
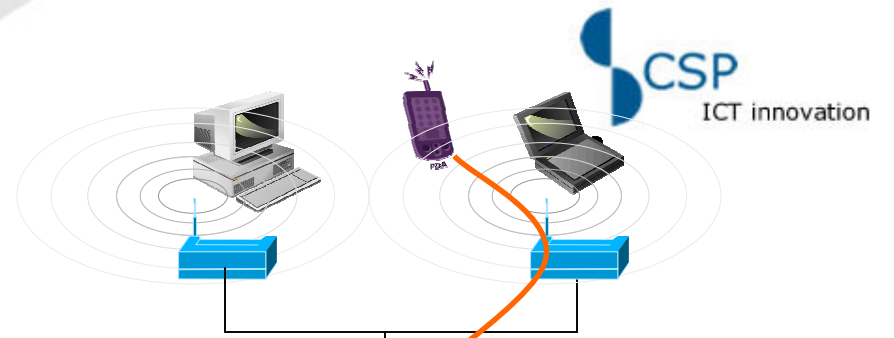
Authentication

WLAN access network

Authentication management

Local Authentication

Remote Authentication (SIM)



[Agenda]

➤ Wireless Campus network

➤ Security

➤ User mobility

➤ **Services**

➤ Open Source

[Services]

- Multimedia services...

- VoIP
 - Performance variable with network conditions
- Instant messaging
- Video multicasting
 - AP not aware of open multicast sessions
- Videosurveillance systems

- ... and challenges

- ▷ QoS
- ▷ Adaptive coding
- ▷ User location aware system
- ▷ Optimized use of bandwidth
- ▷ QoS

[Agenda]

➤ Wireless Campus network

➤ Security

➤ User mobility

➤ Services

➤ **Open Source**

[*Open Source*]

- Open source tools
 - Useful to try and test new features as soon as they are released through draft and proposals
 - Modify operational model of devices for testing purposes or to prototype new features
- Integration of open source with commercial systems as part of interoperability studies

[*Open Source tools*]

- Open access point (802.11b)
 - A linux laptop or PC works as AP
 - Drivers from open source project HostAP <http://hostap.fi>
 - LAB activities:
 - CSP and Politecnico di Torino project to work on QoS issues
 - Access to low levels of the 802.11b interface to test efficacy for LBS techniques
- Freeradius
 - RADIUS server based on Open Source software <http://freeradius.org>
- Open 802.1x client


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Thanks!

[*Information*]

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