

Urbino Wireless Campus
A Wide Area University Network to Bridge Digital Divide

Urbino Wireless Campus: A Wide-Area University Network to Bridge Digital Divide

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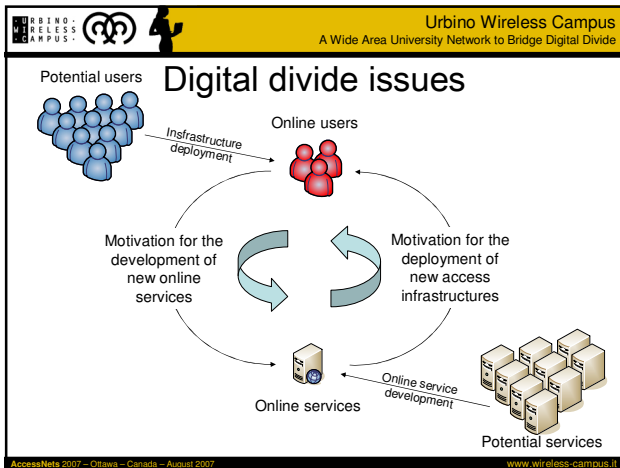
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Outline

- Introduction: universities and digital divide
- The UWic project
- Network
- Services
- Users
- Timeline

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The role of University

- Universities are
 - Historically connected
 - Pioneers in the development of online services and wireless connectivity
 - Providers of valuable online services with a sizeable and stable population of users
- Universities close the positive feedback loop between online users and services

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The University of Urbino

- Founded in 1506
- Tightly related to its territory
- Placed on a rural mountainous region (Montefeltro)
 - Without big metropolitan areas
 - Without densely populated areas
 - With strong digital divide issues
- Perfect example of city-campus
 - Unesco world heritage site
 - With 20.000 students and 16.000 inhabitants

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UWiC: Objectives

- Create a geographical wireless access network to virtually extend the university campus over the entire Montefeltro region
 1. Provide direct access to all University services:
 - e-learning, front office, computational resources, data bases, digital libraries, internet
 2. Offer free information and communication services to citizens and tourists
 3. Help bridge digital divide

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UWiC: Boundary conditions

- Digital divide in Montefeltro
 - Stalemate of broadband access market
 - Lack of conditions to close the positive feedback loop
- Policy constraints
 - Privacy (2002/58/EC)
 - Data retention (2006/24/EC)
- Italian government call for proposals of academic wireless connectivity projects
 - Accelerator of the decision process
 - Co-funding
 - Facilitator of partnership establishment and fund raising thanks to the first place ranking

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UWiC: Philosophy and method

- University leadership
 - Institutional role
 - "University campus" connotation
- Shared solutions to common problems
 - Shared infrastructures and services
 - Scale/scope economy
- Open initiative
 - Make use of open standards and open-source solutions
 - Provide free access to everybody
 - Welcome the collaboration of anyone interested in expanding the network and/or enhancing the services
- Integration model
 - Technology neutral
 - Minimum amount of shared rules

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UWiC: Target area

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Traditional University network

- HotSpots connected to the University intranet
- Authentication required to associate to the hotspots
- Access limited to registered users (students and staff)

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Independent access network

- HotSpots connected to an access network independent from the university intranet
- No authentication required to connect to the HotSpots
- Open access to the wireless network
- Authentication required only to enter the university intranet

- Free open-access services directly provided within the access network

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Network extension

- Integration of existing access networks
- Hybrid technologies used for inter-network links

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Delivery of third-party services

- Integration of third party services
- Shared access infrastructures

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Multigateway access network

- Backbone
 - Hiperlan2 (5.4-5.7 GHz) p-p bridges
 - Virtual LANs across existing fiber infrastructures
 - Dynamic routing (BGP / RIP)
- Residential distribution
 - Hiperlan2 (5.4-5.7 GHz) p-mp base stations
 - Level-2 authentication of CPEs
- Nomadic distribution
 - WiFi (2.4 GHz) p-mp hotspots with Hiperlan CPE
 - Open network
- Inter-networking
 - Heterogeneous technologies (radio bridges, dedicated links, tunnels across Internet)
- Centralized monitoring and management

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Tunneling

- PPPoE
 - Between *residential* users (connected to the Hiperlan backbone) and University / WISP / Third-party gateways
- Client-provisioned VPN
 - Between *nomadic* users (connected to WiFi hotspots) and University / WISP / 3rd-party gateways
 - Cisco VPN and OpenVPN
- IPSEC gateway-to-gateway tunnels
 - Between UWiC and partner networks
 - Between UWiC DMZ and 3rd-party servers
 - Linux

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Services

	Open Non auth.	Open Auth.	Restricted Auth.
Services	UWiC portal Mirrored sites Proximity Tourist info Maps Web radio	Local VoIP Local Chat Booking 3rd-party	E-learning Libraries Internet Global VoIP 3rd-party

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Access

Access	Services
Nomadic	WiFi open network
Residential	Hiperlan with level-2 authentication

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Access-service grid

	Open Non auth.	Open Auth.	Restricted Auth.
Nomadic			
Residential			

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Virtual server farm

- Technology
 - VMWare cluster
 - Linux virtual servers
- Services
 - Apache HTTP server
 - Linux gateway (firewall and captive portal)
 - IDMS (MySQL and OpenLDAP)
 - Authentication (FreeRadius and Soap web services)
 - VoIP (Asterisk)
 - Streaming (Icecast)
 - ...

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University users

	Open Non auth.	Open Auth.	Restricted Auth.
Staff members Students Visiting faculties Conf. attendees	UWiC Free	UWiC Free	Uniurb Free
Access	UWiC Free (w CPE)	UWiC Free (w CPE)	Uniurb Free (w CPE)

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Residents

Access	Services		
	Open Non auth.	Open Auth.	Restricted Auth.
Nomadic	UWiC Free	UWiC Free	WISP 3rd-party
Residential	UWiC Free (w CPE)	UWiC Free (w CPE)	WISP 3rd-party (w CPE)

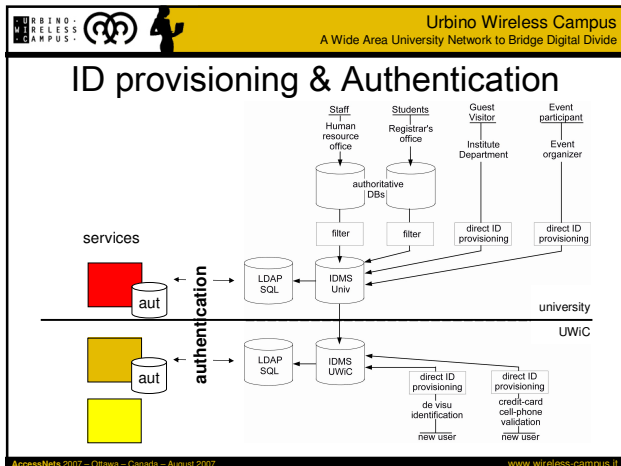
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Tourists

Access	Services		
	Open Non auth.	Open Auth.	Restricted Auth.
Nomadic	UWiC Free	UWiC Free	WISP 3rd-party
Residential			

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Agenda

- Premessa
- Il progetto UWiC
- La rete
- I servizi
- Gli utenti
- Timeline

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Time line

- **08.03.2006.** Submission of the proposal
- 19.06.2006. UWiC lab foundation
- **16.09.2006.** Public presentation of **UWiC alpha 0.0**
 - Hotspots connected to the UWiC VLAN
 - Captive portal, VPN, VoIP
 - Linux machines
 - Test users
- 20.11.2006. **UWiC beta 0.0**
 - IDMS
 - 20.000 active student accounts
- 20.02.2007. **UWiC beta 1.0**
 - Hiperlan backbone
 - WiFi HotSpot on the main public places of Urbino
- 15.03.2007. **UWiC beta 2.0**
 - Virtualization of the server farm
- 22.03.2007. Hiperlan coverage of Fano and Pesaro
- **07.07.2007.** **UWiC gold 0.0**
 - WISP
 - Third-party web sites and services

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Ongoing activities

- Connection to partner networks
- Network extension
- Points of presence
 - Info-points
 - Technical assistance
 - ID provisioning
 - UWiC cafés
 - UWiC hotels
- Wireless multicasting
- In-house web radio
- Monitoring and assessment

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In summary

- UWiC is a multigateway geographical wireless access network under complete control of the University of Urbino
- Technical solutions are developed, deployed and maintained by the UWiC lab, which is a University research lab
- UWiC is now ready to be used as a testbed for conducting real-world experiments to test new ideas and solutions on the field