

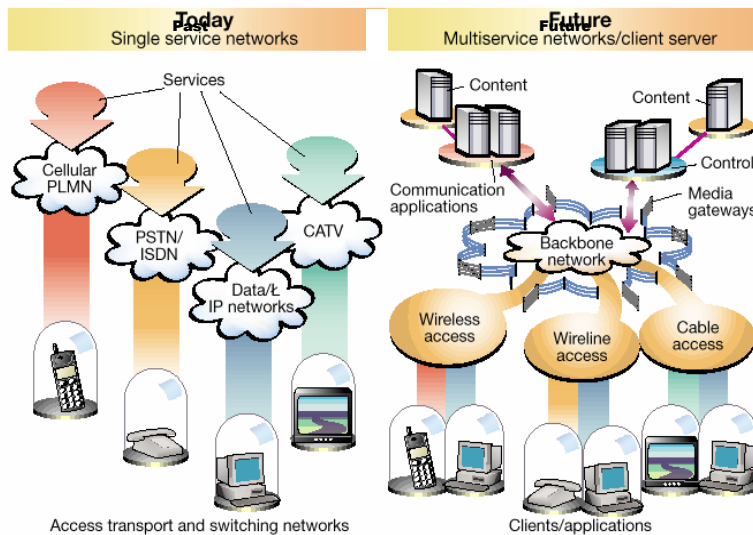
Enabling Heterogeneous Wireless Networking: Technologies and Challenges Ahead

Panel Discussion 2
IEEE Vehicular Technology Conference
Milan, Italy
May 18, 2004

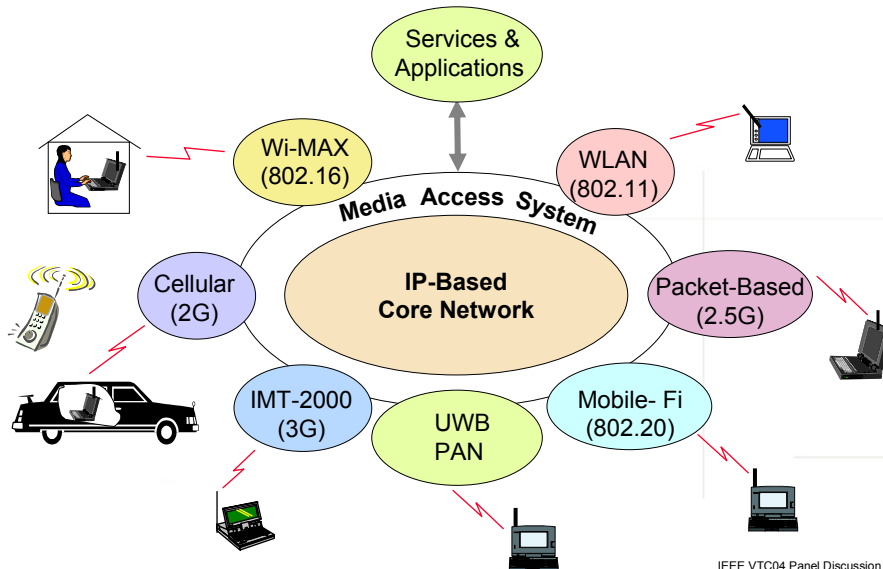
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An SBC Company

Evolution to Multi-Service Networks



Heterogeneous Wireless Networking



Challenges Ahead

- Consistent access control
- Seamless mobility and handover management
- Services and applications
- Seamless QoS
- Security
- Efficient routing and MAC
- Pricing and subscription
- Standardization



ELEMENTIVE



Panel Speakers

- Dr. Vijay Varma
 - Senior Scientist – Telcordia Technologies
 - Integration of cellular and WLANs
- Dr. Max Ott
 - Chief Technology Officer – Semandex Networks
 - Do we need seamless networks?
- Dr. Jorge Pereira
 - Scientific Officer – European Commission
 - Towards efficient spectrum usage
- Dr. Peter Karlsson
 - Expert – TeliaSonera
 - Heterogeneous radio access for seamless services and low cost

IEEE VTC04 Panel Discussion – 5



ELEMENTIVE

Integration of Cellular Wireless and WLANs

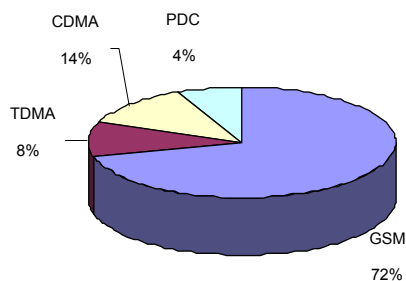
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May 18, 2004

Outline

- Cellular and WLAN characteristics
- Compete or Complement?
- Cellular/WLAN integration alternatives
- Issues and challenges
- Industry activities
- Role in Telematics
- Telcordia capabilities
- Summary

Mobile Subscribers Worldwide (as of Feb '04)



Total Worldwide mobile subscribers (including analog): 1430 M

Total Worldwide digital mobile subscribers: 1411 M

GSM Subscribers: 1024 M

UMTS subscribers: 3.4 M (0.23%)

Source: GSM World
<http://www.gsmworld.com/news/statistics/substats.shtml>

Cellular Wireless vs. WLANs

- Cellular Wireless
 - Good coverage, mobility, voice support, QoS
 - Large subscriber base, 2B subscribers expected by 2008
 - High cost, low to medium bandwidth
 - 3G deployment slower than expected
- WLANs
 - Higher bandwidth, low cost, free spectrum
 - IP connectivity in residence, small office, and campus
 - WLAN hotspots – a new phenomenon
 - Low coverage, low mobility, interference
- Market facts and forecasts
 - More U.S. consumers will use WiFi than 3G by 2007- (Pyramid research)
 - 70,000 hotspots worldwide by the end of 2003 (Gartner)
 - Lufthansa, Boeing to launch in-flight WiFi (Fierce Wireless)
 - HP, BMW show off in-car WiFi (Fierce Wireless)

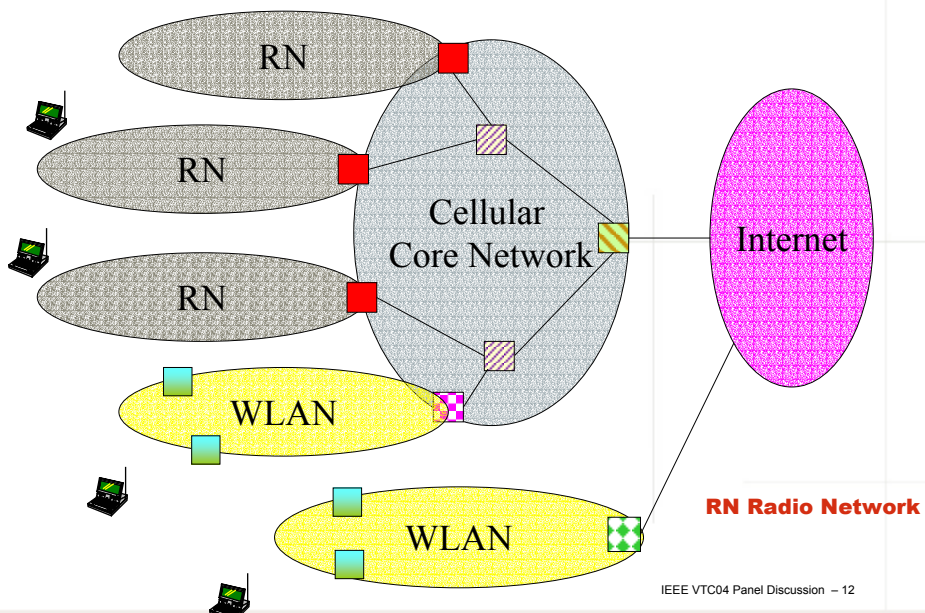
Compete or Complement ?

- 3G wireless and WLAN offer higher speed wireless connections (than 2G) – compete?
- Each has niche market – complement?
 - High data rate applications may not need high mobility and wide area coverage
- Cellular/WLAN integration: best of both worlds
 - Single subscription and roaming between the two networks
 - Seamless service continuity across the two networks
- Benefits to cellular operators
 - Low cost alternative for hot spot coverage
 - Reduce traffic from cellular radio access network
 - More revenue from high-rate data services
- Benefits to LAN operators
 - Larger subscriber base
 - Provides roaming and wide area support

Business Drivers

- Cellular and WLAN operators
 - Integrated offerings
- Cable TV operators as MVNO partners
 - Microcells in residences, offices
 - Ability to resell mobile service
- Voice over WLAN
 - Push for fast roaming standard
 - Integration of VoWLAN with cellular
- Telematics
 - Driving assistance
 - Information and entertainment in vehicles
 - Location-based services and situational awareness

Cellular/WLAN Integration Alternatives



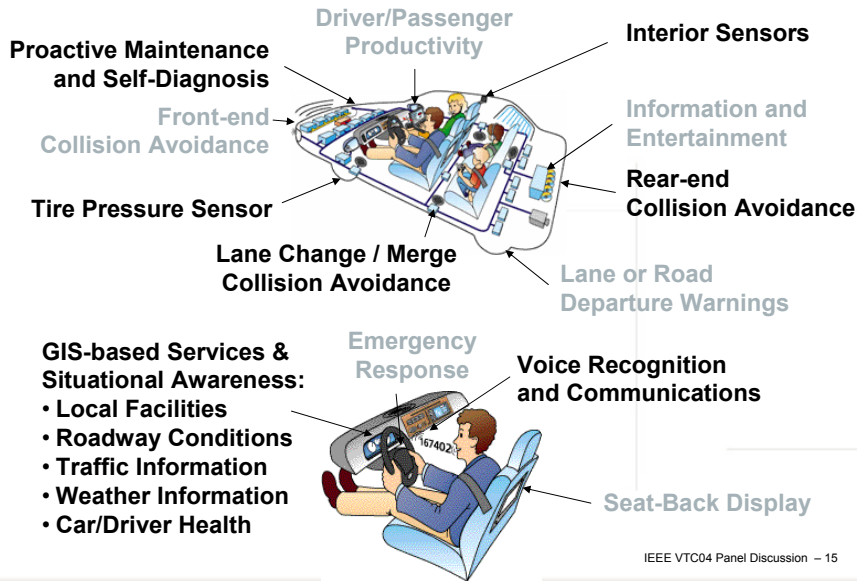
Issues and Challenges

- Access control
 - Single subscription
 - Mutual authentication
 - Authorization and Accounting
- Mobility Management
 - Maintain session during system change
 - Seamless handoffs
- Standardization activities
 - Third Generation Partnership Project (3GPP)
 - Defined interworking scenarios, architecture
 - Completed common access control, charging
 - Next – Access to PS services
 - 3GPP2
 - WLAN interworking focus group

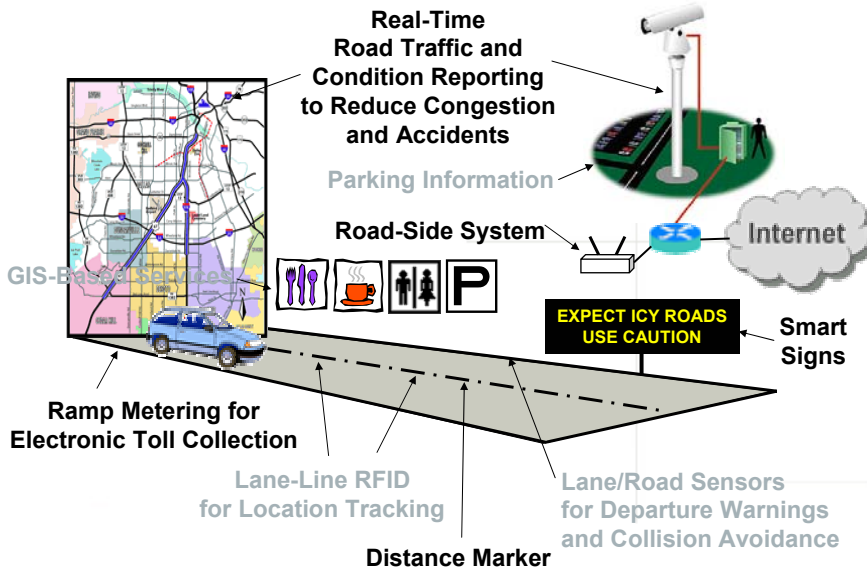
Industry Activities

- Ericsson/Telenor H2U project
 - Early work in 2001 and 2002
- Sonera/Nokia
 - Wireless LAN roaming using GSM technology
- Swisscom Mobile
 - PWLAN roaming with Telia HomeRun and Swiscom Eurospot – 700 hotspots in 12 countries
- GSMA
 - EAP/SIM authentication
- Lucent/T-Mobile
 - 3G WLAN roaming
- KT
 - Integration of Portable Internet (PI) and WLAN
- Kineto Wireless
 - Mobile over WLAN (MoWLAN) – voice and data services in homes, offices, and hotspots
- BridgePort Networks
 - VoWLAN calls using mobile identity
- Nextel/RadioFrame
 - Integrated cellular and WLAN service on campus
- Many others
 - NTT DoCoMo, Motorola, NEC,

Telematics and WLANs .CAR - A Ubiquitous Communications Node



Telematics and WLANs .ROAD - Ubiquitous Awareness for Transportation



Telcordia Capabilities

- UMTS/802.11 testbed (with LTS)
 - Tight coupling architecture
 - GPRS-based mobility management
 - Integration of location-based services
- ITSUMO (with Toshiba)
 - Universal mobility among enterprise, cellular and WLAN
 - Fast roaming/handoff across different access
 - QoS aware interface selection
 - System-level management to save device power
- Knowledge of MVNO business and VoIP business
 - Experience working with large operators
- Technical leadership in Telematics
 - Chief Architect of the Global System for Telematics (GST), EU-funded initiative for delivery of services to the vehicle
 - Extensive experience, learned in the Telecom domain and in vehicle communication projects, of the problems now facing vehicle systems

Closing Remarks

- Both cellular and WLANs have grown rapidly
- Cellular and WLANs compete in some segments, but mostly they complement
- Cellular/WLAN integration helps operators and users
- There are multiple options to integrate the two technologies
- Cellular/WLAN integration challenges are addressed by the industry and standards bodies
- Industry is very active in the cellular/WLAN integration
- Telematics requires heterogeneous networking
- Telcordia capabilities include 3G/WLAN testbeds, working with MVNO, and leadership in Telematics

**Ref - Special Issue On Interaction 3G Wireless and Wireless LANs
IEEE Communications Magazine, November 2003**