Convergence of 3G and WLANs

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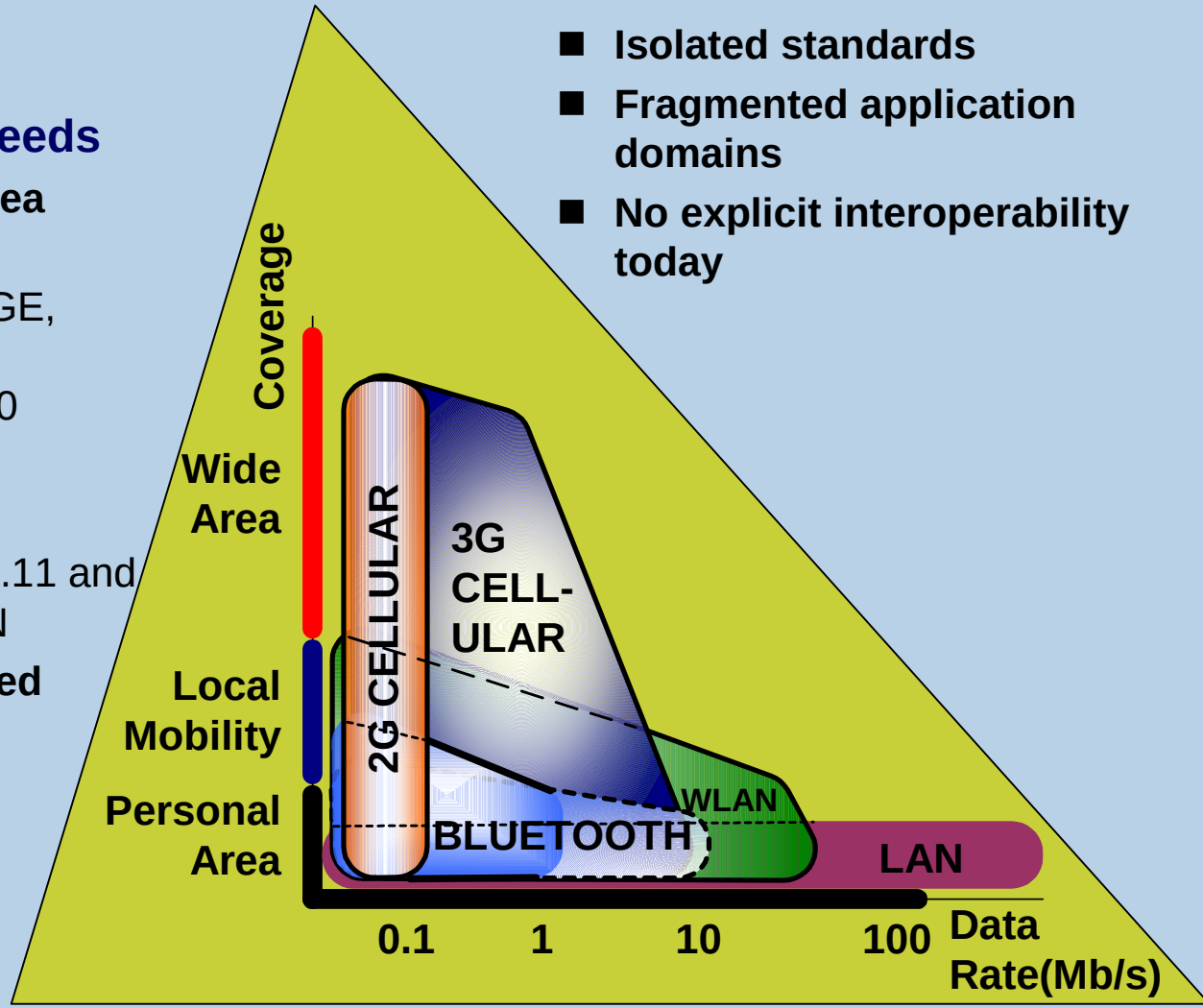
Scenarios

Wireless communication needs

- **Medium speed wide area coverage**
  - Cellular/3G: GSM/EDGE, WCDMA, cdma2000
- **High speed hot-spot coverage**
  - WLANs: IEEE 802.11 and HiPerLAN
- **Low/Medium/High speed peer-to-peer networks**
  - PAN: Bluetooth

Problems

- **Isolated standards**
- **Fragmented application domains**
- **No explicit interoperability today**

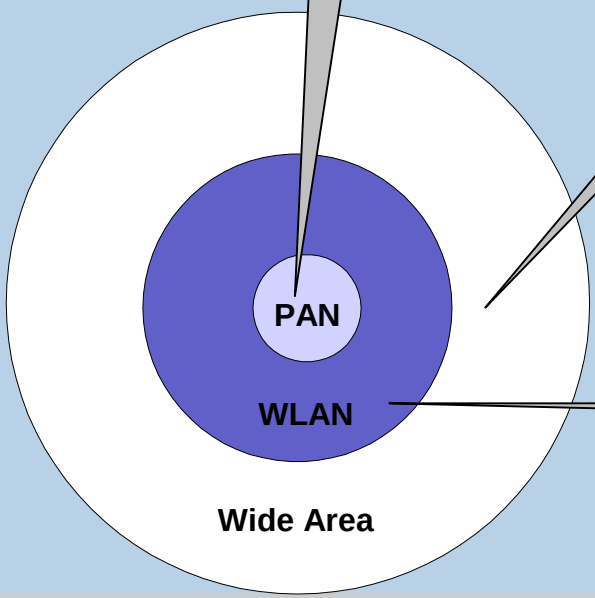


Device Characteristics

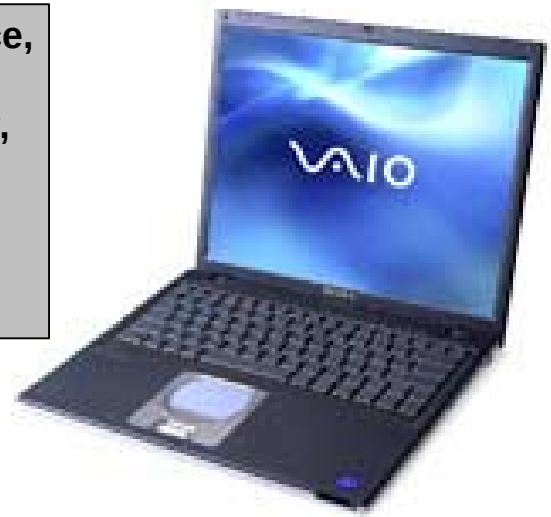
Distributed devices,
low power,
long talk and standby,
wearable,
high speed
voice+data

Small target device,
low power,
long standby,
medium talk time,
wearable,
voice+data
high speed

Large target device,
high power
medium standby,
low talk time,
portable,
data centric,
very high speed




Tactel
+Palm



Bluetooth Technology

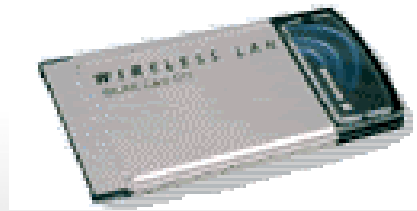
Strengths

- Robust to interference
- Microsoft, Apple backing will propel adoption by PC industry
- Number of Bluetooth modules shipped now exceeds 802.11b (TDK Systems Europe information)
- Good peer-to-peer communication system
- 10 Mb/s system will use 1 Mb/s channel as a fallback

Opportunities

- Good integration and coexistence with 5GHz WLANs
- Every 3G phone will support Bluetooth
  - Large scope for new applications
- Low cost is finally reality

WLAN Technology



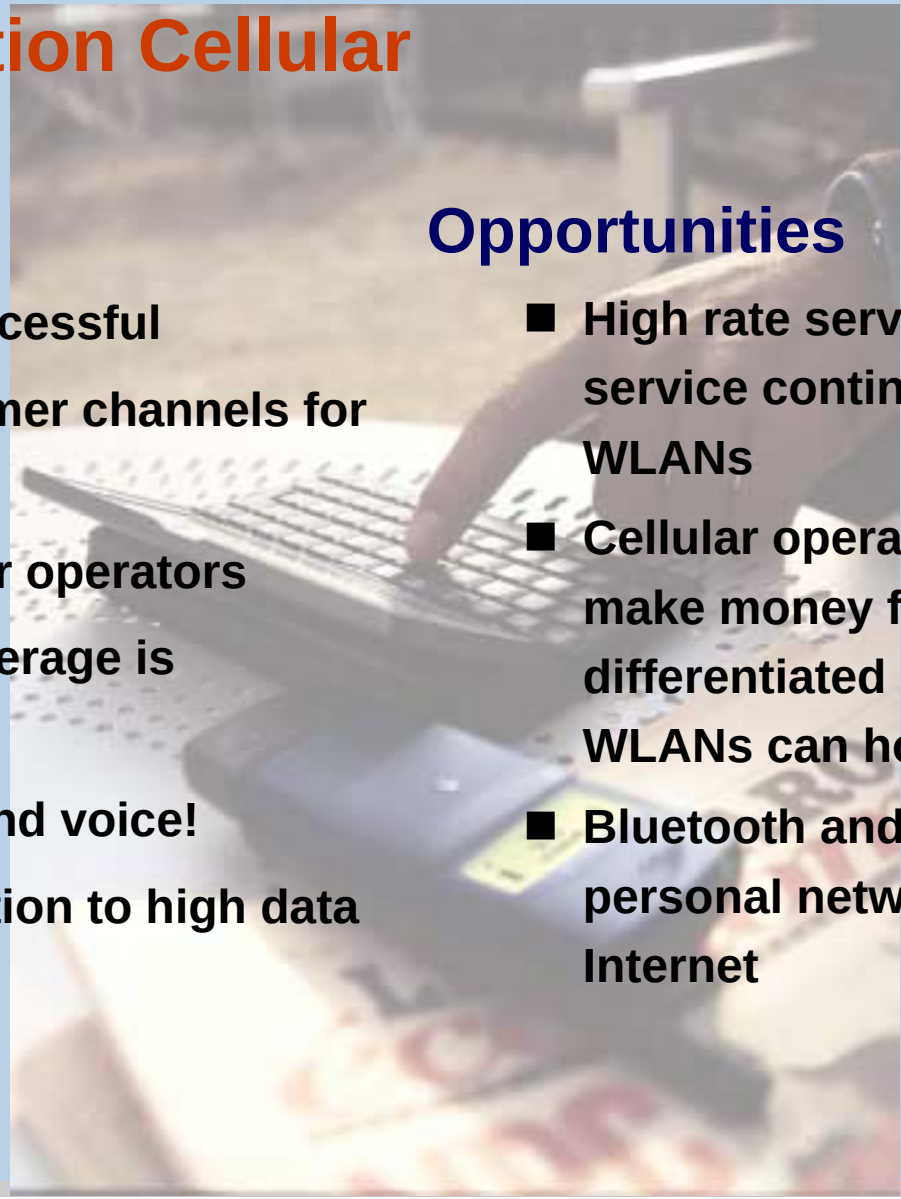
Strengths

- 802.11b has had initial success in the home and the enterprise
- Evolution to 802.11a
  - Enterprise will likely accept
- Standards process addresses most weaknesses

Opportunities

- Integration with cellular for unified mobility and authentication
- Wireless ISPs have a choice for collaboration
  - Cellular and broadband

Third Generation Cellular



Strengths

- Cellular is successful
- Strong consumer channels for services
- Real profits for operators
- Wide area coverage is important
- Voice, voice and voice!
- Cellular evolution to high data rates

Opportunities

- High rate services ensure service continuity with WLANs
- Cellular operators are able to make money from differentiated services -- WLANs can hop on
- Bluetooth and 3G extend the personal network into the Internet

Approaches for 3G+WLAN

Two options

ONE: integrate WLAN with the UMTS core network

- Complicated, needs new hardware

TWO: connect billing and subscriber profile alone

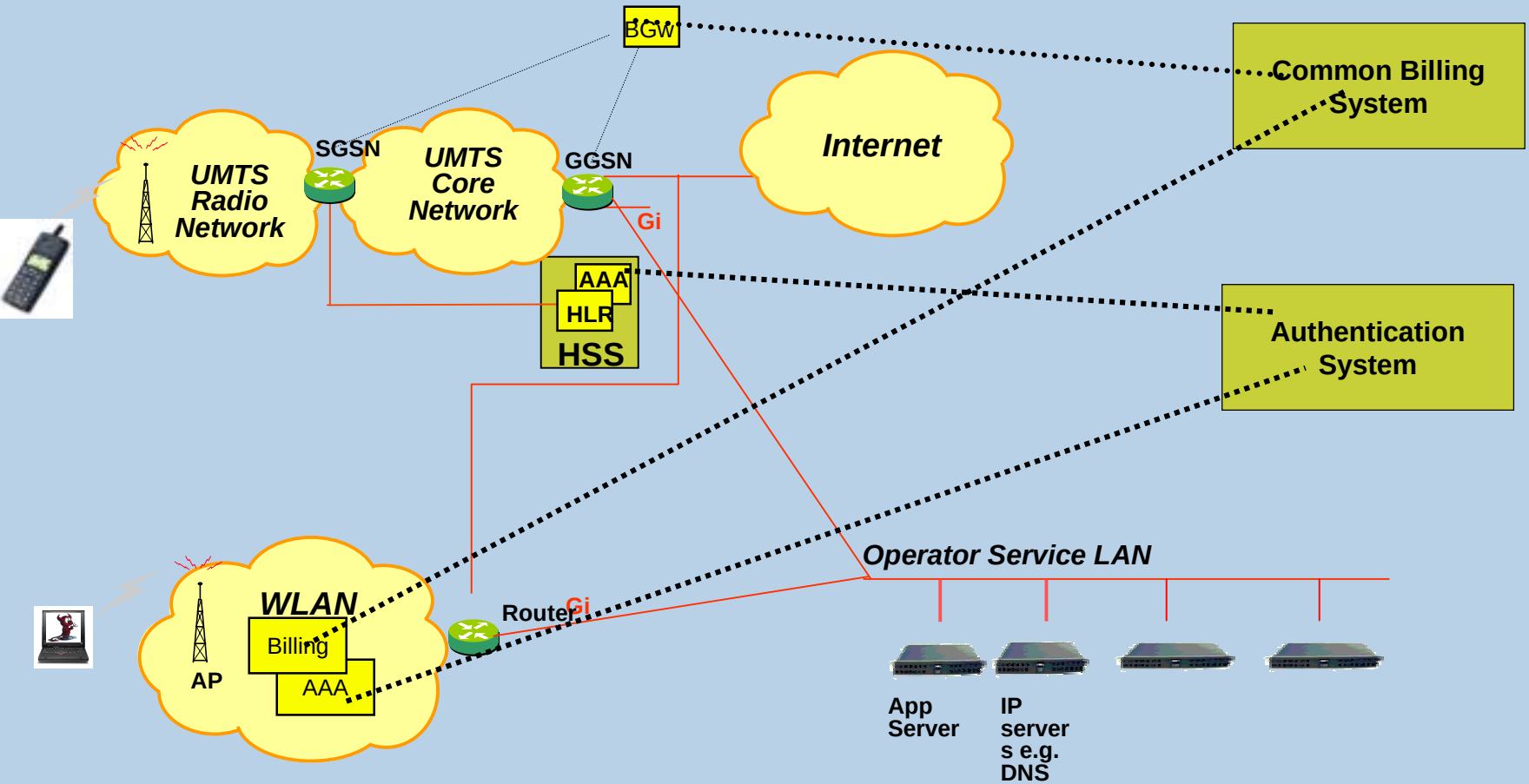
- Easy security and mobility for users cellular techniques
  - 3G HSS supports IETF AAA as well as HLR
- Unified billing

Increased data use in wide area because of hot-spot

Issues

- **Service continuity to the wide area for multimedia**
  - Demand from operators exists
  - Mobile IP based solution possible
- **Billing**
  - Wide area connectivity costs more than local area connectivity
- **Service architecture integration is difficult**

Integrated 3G and WLAN Example



Conclusions

PANs, WLANs and cellular extend the users connectivity in a complementary and hierarchical manner

- Vision: Integrated Services Multimedia Network

WLAN systems and 3G cellular offer each other opportunities for success

- Encourages users to continue in the wide area
- Easy glue for the WLAN provider
  - Security, roaming and mobility possible today

PANs offer convenience to access services

- Take an “always connected” principle to the personal space
- Decouple the terminal and the application from the access method

Service positioning for WLAN and 3G

- Bundling of services with unified billing
- Emphasize roaming, security and mobility advantages of cellular
- Integrated service offering not easy but applications will naturally adapt

Abbreviations

3G:	Third Generation
AAA:	Authentication and Authorization
BGw:	Billing Gateway
DNS:	Domain Name Service
GHz:	Billion (Giga) cycles per second
GGSN:	Gateway GPRS Support Node
GPRS:	General Packet Radio Service
GSM:	Global System for Mobile Communications
EDGE:	Enhanced data Rates for Global Evolution
HiPerLAN:	High Performance wireless LAN
HLR:	Home Location Register
HSS:	Home Subscriber System
IETF:	Internet Engineering Task Force
IEEE:	Institute of Electrical and Electronics Engineers
IP:	Internet Protocol
LAN:	Local Area Network
Mb/s:	Millions of (mega) bits per second
PAN:	Personal Area Network
PC:	Personal Computer
SGSN:	Serving GPRS Support Node
UMTS:	Universal Mobile Telecommunications System
WCDMA:	Wideband Code Division Multiple Access
WLAN:	Wireless LAN