

Elemente de Informatică Mobilă

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Informații despre curs



- Teorie: nivel fizic, MAC, servicii, localizare
 - Tehnologie: Android, 3G, 4G, WiFi, SIP, VoiP, GPS
 - Practică: Android, rețelistică, servicii, SIP, localizare
- } Curs
- Laborator

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- Structura notei

- 50% colocvii , cu materiale – **minim 25%**
- 10% bonus laborator
- 20% parțial, cu materiale
- 30% examen, cu materiale
 - **parțial + examen = minim 25%**

- Echipa: Dragoș Niculescu, Andrei Roșu-Cojocaru, Radu Stoenescu

- **Parțial, examen**
 - open book
 - Fără electronice
 - 5min/întrebare
 - slide-uri nu sunt suficiente
 - punctaj minim de trecere
- **Laborator**
 - Rocade doar în persoană, doar săptămâna 1 & 2
 - **Locul în laborator determină planificarea la colocviu**
- **Colocvii**
 - Open book, ocw, no chat
 - Corectare în trepte
 - punctaj minim de trecere

- Slide-uri de prezentare

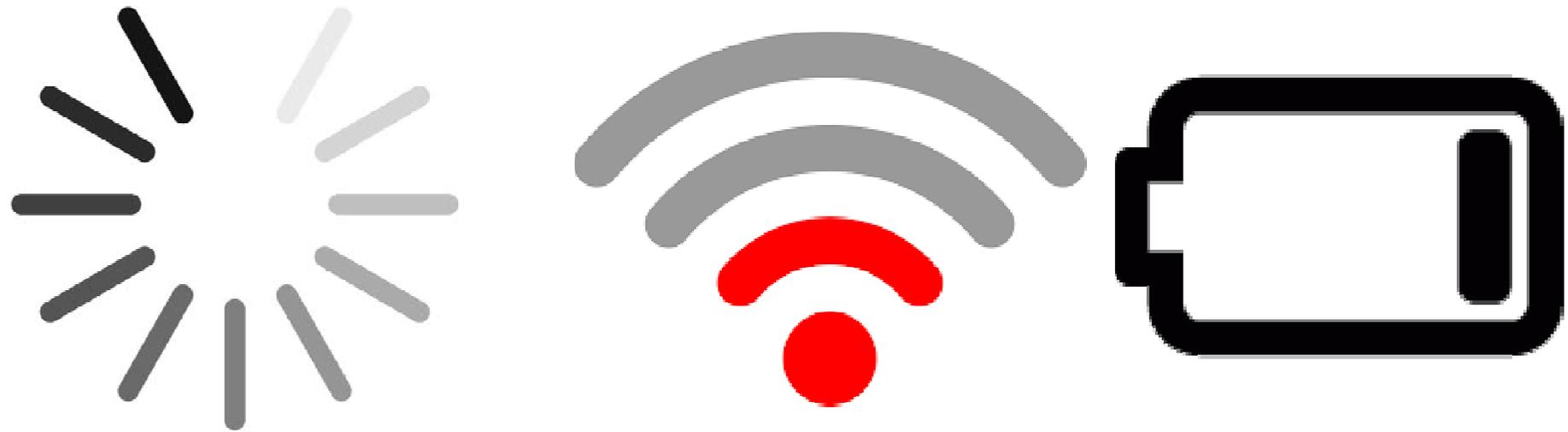
NU sunt suficiente pentru examen

- documentație obligatorie:

1. Karim Yaghmour, “Embedded Android”, cap 2
2. Jochen Schiller, *Mobile Communications* 2nd ed, cap 3,4,7-9
3. A. Tanenbaum 4th ed, *Rețele de calculatoare*, selecție
4. Stuart Chesire “Zeroconf The Definitive Guide”, cap 2,3,4
5. H. Sinnreich “Internet Communications using SIP”, cap 6,18
6. John Krumm “Ubiquitous Computing Fundamentals”, cap 7

- <http://ocw.cs.pub.ro/courses/eim/reading>

mobile computing? ...trei spaiime



- Informatica mobilă cuprinde

- Sisteme distribuite
- Rețelistica mobilă/radio
- Hardware/Software mobil
- Ubiquitous computing
- Pervasive computing
- Sensor networking
- IoT

- Problematika

- Interfața
- Consum energie
- Securitate
- Conectivitate
- Scalabilitate
- Localizare

Cum se plasează acest curs în problematica generală a informaticii mobile?

Probleme interconectate!

Discuție paranteză



- **Informatica mobilă cuprinde**
 - Sisteme distribuite
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 - Ubiquitous computing
 - Pervasive computing
 - Sensor networking
 - ...

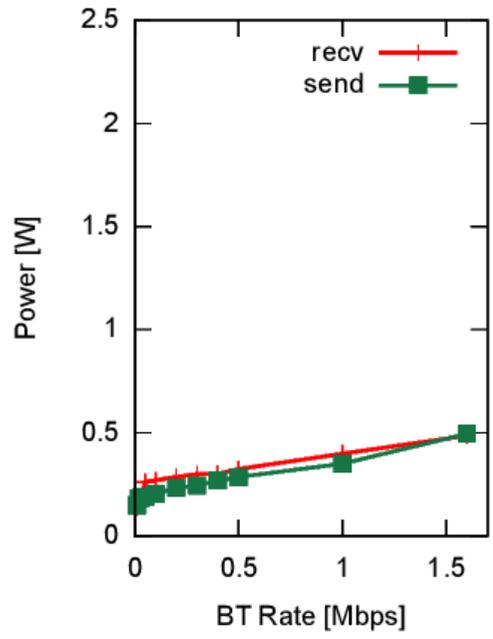
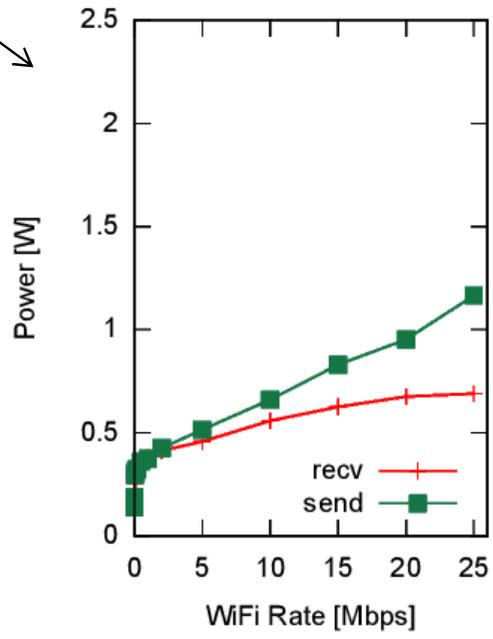
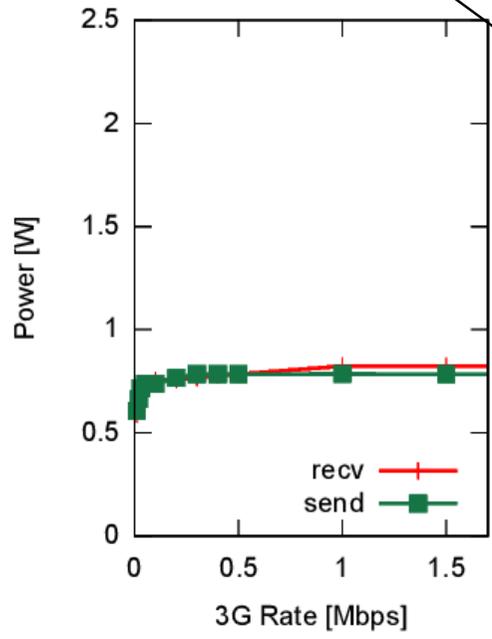
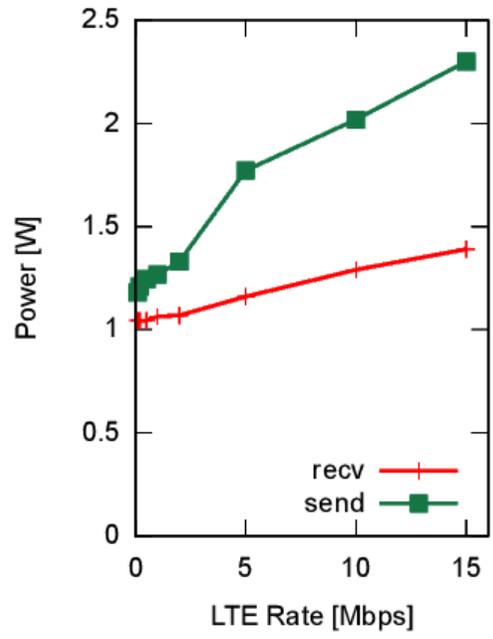
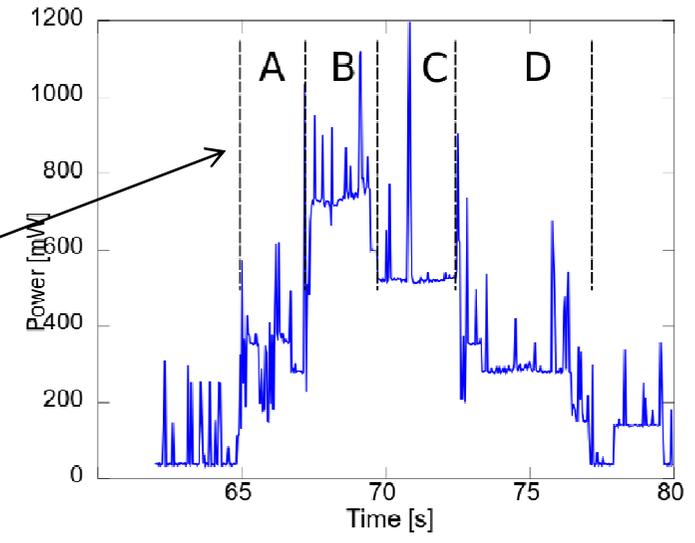
- **Problematica**
 - Interfață
 - Consum energie
 - Securitate
 - Conectivitate
 - Scalabilitate
 - Localizare

Energia consumată: 4G, 3G, WiFi, BT



Telefon Galaxy Nexus, cu ecranul închis

ping -c1 8.8.8.8(3G, RDS)
wget/iperf



C. Nicuțar et al, Using Cooperation for Low Power Low Latency Cellular Connectivity. CoNEXT 2014

Energia consumată de aplicații/3G



Applications	Network 1 T1=6s, T2=6s		
	Average current (mA)	Projected battery life (h)	Drain speed
None	6.1	268.7	x1
Google services	9.0	183.7	x1.5
Google, WhatsApp	12.3	134.4	x2.0
Google, Viber	12.6	131.4	x2.0
Google, Skype	17.2	95.9	x2.8
Google, Facebook	10.2	162.6	x1.7
Google, Skype, WhatsApp, Viber	22.4	73.5	x3.6
Applications	Network 2 T1=8s, T2=12s		
	Average current (mA)	Projected battery life (h)	Drain speed
None	5.9	279.7	x1
Google services	22.5	73.3	x3.8
Google, WhatsApp	28.3	58.4	x4.8
Google, Viber	27.5	59.9	x4.7
Google, Skype	31.8	51.9	x5.4
Google, Facebook	22.9	72.1	x3.9
Google, Skype, WhatsApp, Viber	54.5	30.3	x9.2

Table from A. Aucinas et al, Staying Online While Mobile: The Hidden Costs, CONEXT 2013

- Informatica mobilă cuprinde

- Sisteme distribuite

- **Rețelistica mobilă/radio**

- **Hardware/Software mobil**

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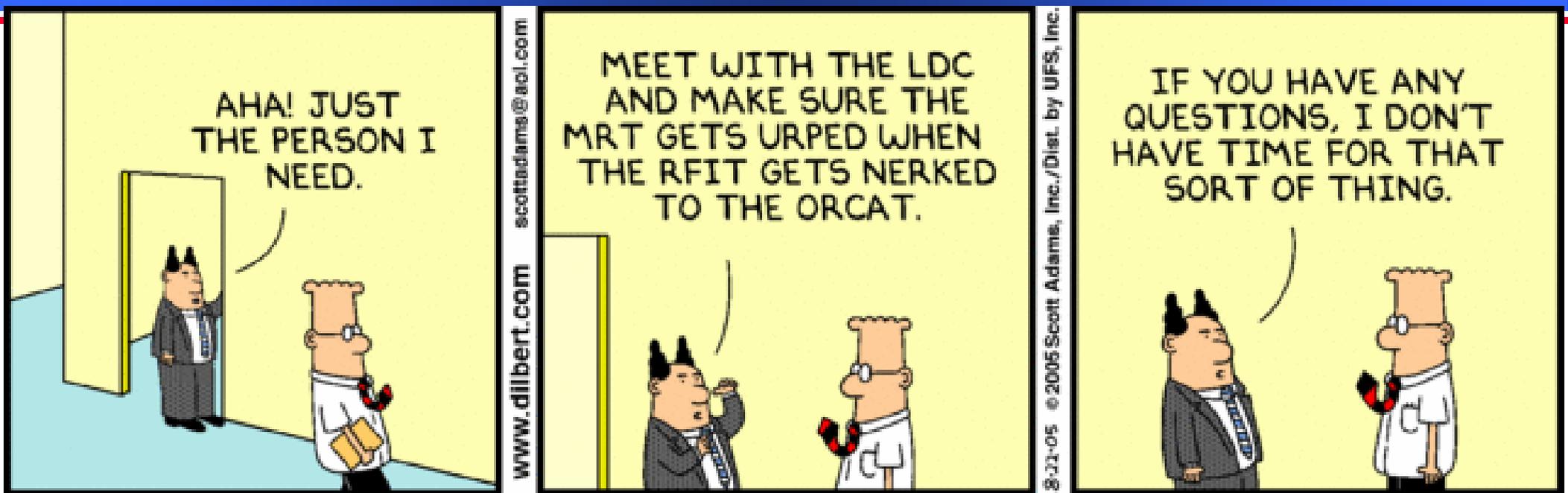
- Localizare

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Probleme interconectate!

- Android
- Noțiuni generale despre radio
- Accesul la mediu
 - SDMA, FDMA, TDMA, CDMA
 - CSMA/CA
- Sisteme de comunicații mobile
 - 2G: GSM
 - 3G: UMTS
 - 4G: LTE
- WiFi
 - 802.11a/b/g/n/ac/ad
 - Infrastructuri
- Mobile IP
 - Locator/Identifier split
 - Routing
- Mobilitate nivel transport
 - I-TCP, middlebox-uri
- VoIP
 - QoS, SIP
- Descoperire servicii
 - zeroconf, mDNS, DNS-SD
- Servicii de locație
 - Exterior: GPS, CellID
 - Interior: WiFi

foartemulteacronime...



3GPP ACH **ACK** ACL ADSL AES AP ARQ ATIM ATM BCCH BCH BER BFSK B-ISDN BNEP BPSK
BSC BSS BSS BTS CBR CC CCA CCCH CCH CCK CD CDN CDMA CGI CIDR CIF COA Codec CRC
CS **CSMA**CSMA/CA CSMA/CD CTS CW DA DBPSK DCF DHCP DIFS **DNS** DOP DS DSL DSSS DTIM
DVB ECN EDGE EIRP ESS FA FCH FDM FDMA FEC FHSS FIB FOMA FSK GGSN GPRS **GPS** GRE
GSM HA HDLC HDTV HID HLR HM HO HSDPA **HTML** HTTP IAPP IBSS ICMP IEEE IETF IFS IMEI
IMSI IP IrDA ISDN ISI I-TCP ITU-T JPEG L2CAP LAN **MAC** MACA MANET MH MIMO MPEG **MPLS** MS
MSC TCP NAV NAT NFS OFDM OSS OTA PCH PCM PDA PHY PIN PKI PLCP PLL PMD POTS PSK
PSM PSTN PUK QAM QoS QPSK RACH RCH RFCOMM RFID RFC RIP RPC RSS RTS **RTT** S-DMB
SA SAAL SACCH SAMA SAP SAT SATM SC SC SCF SDM SDMA SDR SGSN SIFS SIM SIP SLP SMS
SS7 SSL TCH TCP **TDD** TDM TDMA TOS TSF TTL UDP UE UMTS UPnP URL UTRA UWB VAD VBR
VLR W3C WAN WCDMA **WLAN** WLL WPA2 WPAN WWAN WWW XML ZEROCONF

- **google: “best of CES 2017”**
 - **Wearables, IoT, Gamification of life, voice assistants**
- **To read: Mark Weiser, *The Computer for the 21st Century***
 - “...most profound technologies are those that disappear into the fabric of everyday life”