Telekomunikacioni servisi i tehnologije

Profesor dr Miroslav Lutovac

Telekomunikacioni servisi i tehnologije

- Status predmeta: **Izborni**
- Broj ESPB: **6**
- Cilj predmeta:
  - **Upoznavanje sa različitim savremenim**
    - **telekomunikacionim tehnologijama i**
    - **uslugama**
    - **njihovom primenom u različitim poslovnim okruženjima**

Telekomunikacioni servisi i tehnologije

- Status predmeta: **Izborni**
- Broj ESPB: **6**
- Ishod predmeta:
  - **Po završetku kursa će imati pregledno znanje iz oblasti različitih savremenih telekomunikacionih tehnologija**
  - **Poznavaće osnovne karakteristike prednosti i nedostatke kao i moguće primene ovih tehnologija u različitim poslovnim okruženjima**

Sadržaj predmeta

- Uvodno predavanje. Program predmeta,organizacija i sadržaj kursa. Veza sa drugim kursevima
- Radiofrekvencijska identifikacija (RFID)
- Globalni sistem za pozicioniranje (GPS)
- Bežične senzorske mreže
- Standardne i dodatne usluge fiksne telefonije
- Pristup Internetu Dial-up, ISDN, ADSL
- Internet i osnovne usluge (elektronska pošta, telenet, FTP, SSH,WWW) sa aplikacionog nivoa
- Prenos govora preko internet protokola (VoIP)
- ...

Sadržaj predmeta

- . . .
- Multimedijalne usluge bazirane na internet protokolu (IPTV)
- Sistemi mobilne telefonije prve, druge, treće generacije
- Sistemi mobilne telefonije četvrte generacije i WiMAX
- Personalne i lokalne računarske mreže, podešavanje wireless router
- Digitalni radio
- Digitalna telvizija
- Zaključna razmatranja. Pravci daljeg stručnog usavršavanja

➢ Praktična nastava prati program predavanja

Literatura

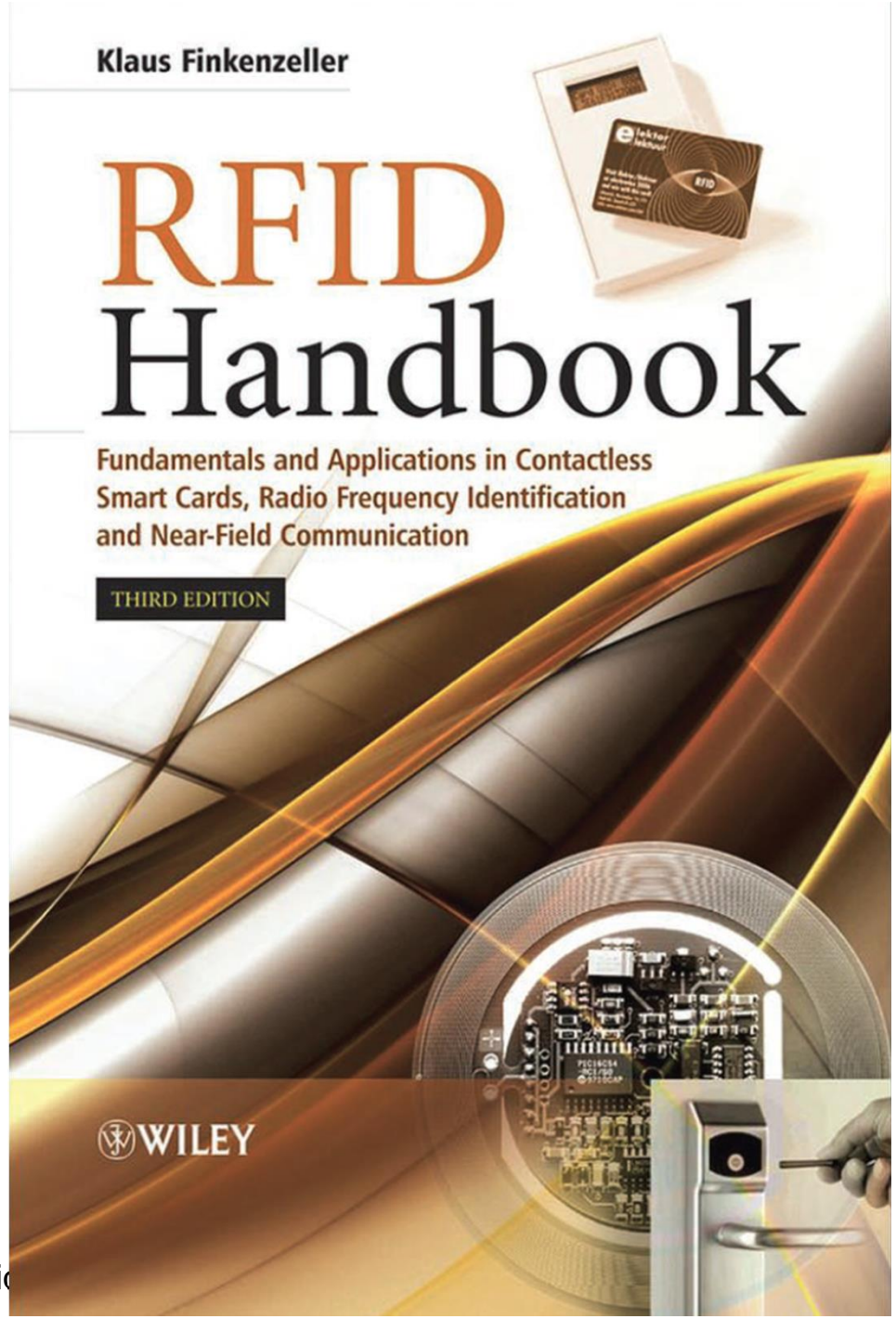
- Klaus Finkenzeller, RFID Handbook: Fundamentals and Applications in Contactless Smart Cards and Identification 3rd Edition, John Wiley Sons, 2010.
- Elliott D. Kaplan, Editor, Understanding GPS, Principles and Applications, Artech House, inc., 2005.
- Lawrence, Harte, Avi, Ofrane, Telecom Systems, PSTN, PBX, Datacom, IP Telephony, IPTV, Wireless and Billing, Althos, 2006.
- Ray Horak, Telecommunications and Data Communications Handbook, John Wiley Sons, 2007.
- Joseph P. Barringer, Editor, Telecommunications: Applications, Modern Technologies and Economic Impact, M. Lutovac, V.Pavlović, V. Mladenović, Computer Algebra and Symbolic Processing in Modern Telecommunication Applications: A New Kind of Survey, Nova Science Publishers, 2014

Metode izvođenja nastave

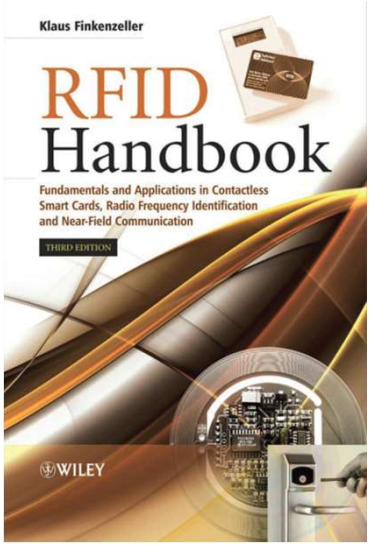
Predavanja, vežbe, konsultacije, pismena izrada

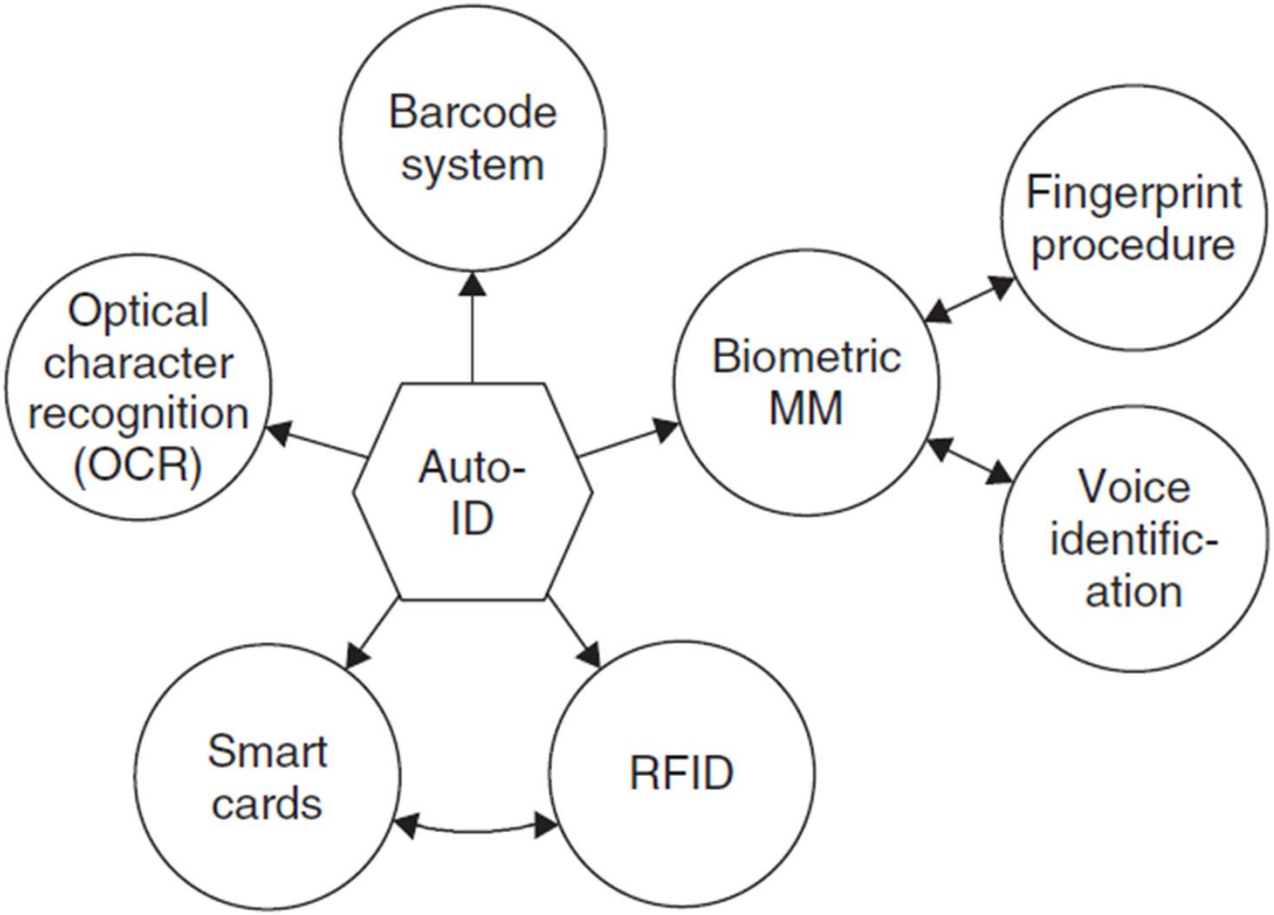
- ✓ Ocena znanja (maksimalni broj poena 100)
- ✓ aktivnost u toku predavanja 10
- ✓ praktična nastava 10
- ✓ kolokvijum 50
- ✓ Pismeni (usmeni) ispit 30

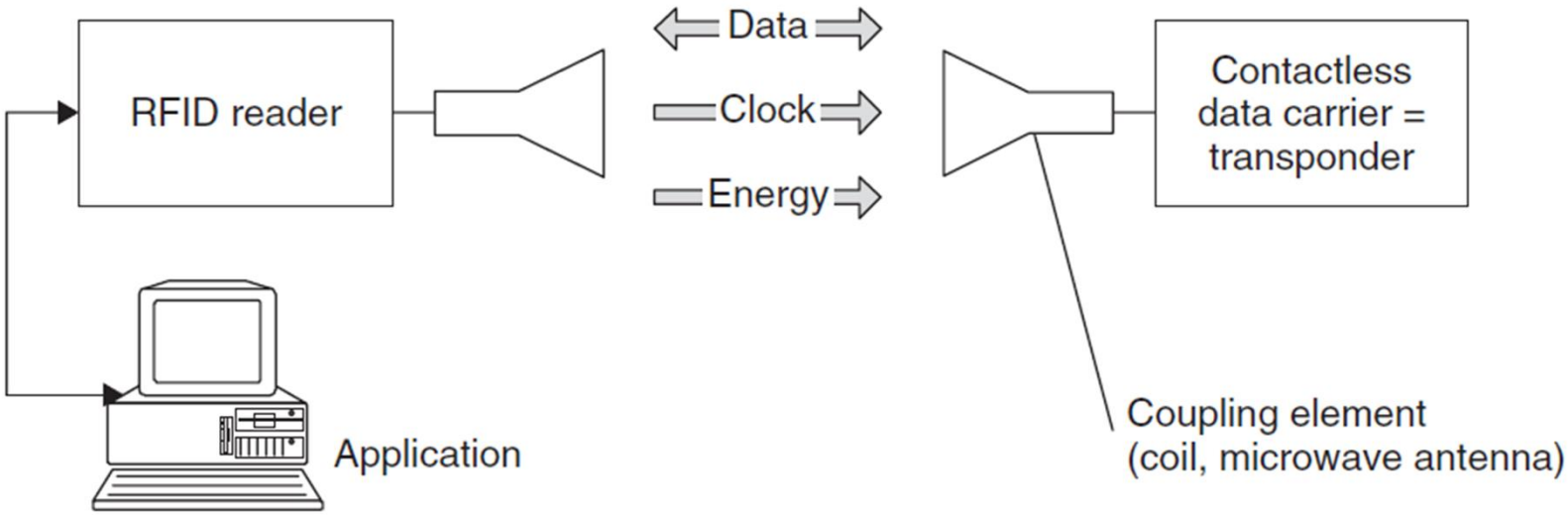
Klaus Finkenzeller,
RFID Handbook:
Fundamentals and
Applications in Contactless
Smart Cards and
Identification
3rd Edition
John Wiley Sons, 2010.



1. Introduction
2. Differentiation Features of RFID Systems
3. Fundamental Operating Principles
4. Physical Principles of RFID Systems
5. Frequency Ranges, Radio Licensing Regulations
6. Coding and Modulation
7. Data Integrity
8. Security of RFID Systems
9. Standardisation
10. The Architecture of Electronic Data Carriers
11. Readers
12. Manufacture of Transponders, Contactless Smart Cards
13. Example Applications

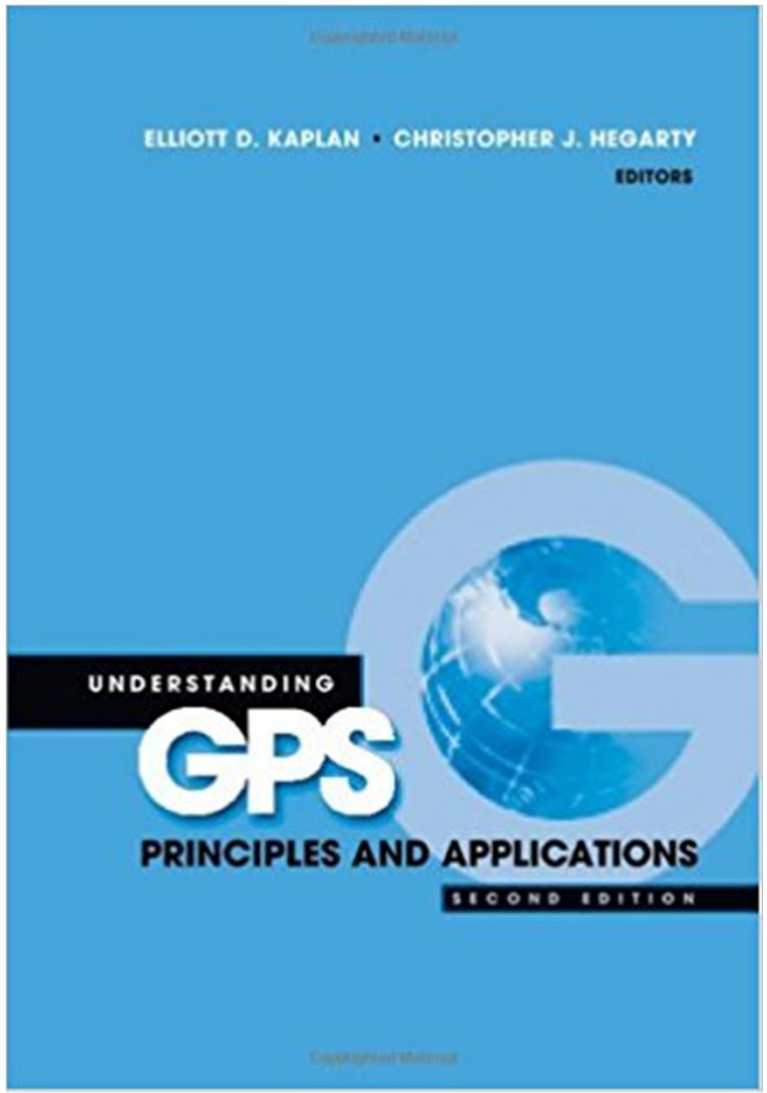



Barcode system
Fingerprint procedure
Optical character recognition (OCR)
Biometric MM
Auto-ID
Voice identific-ation
Smart cards
RFID

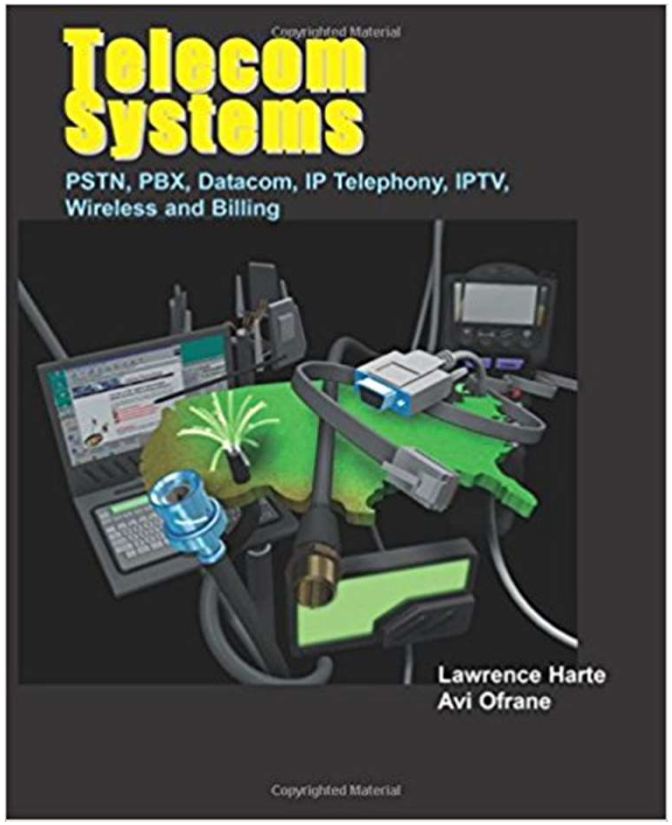

RFID reader
Data
Clock
Energy
Contactless
data carrier =
transponder
Application
Coupling element
(coil, microwave antenna)


hitag

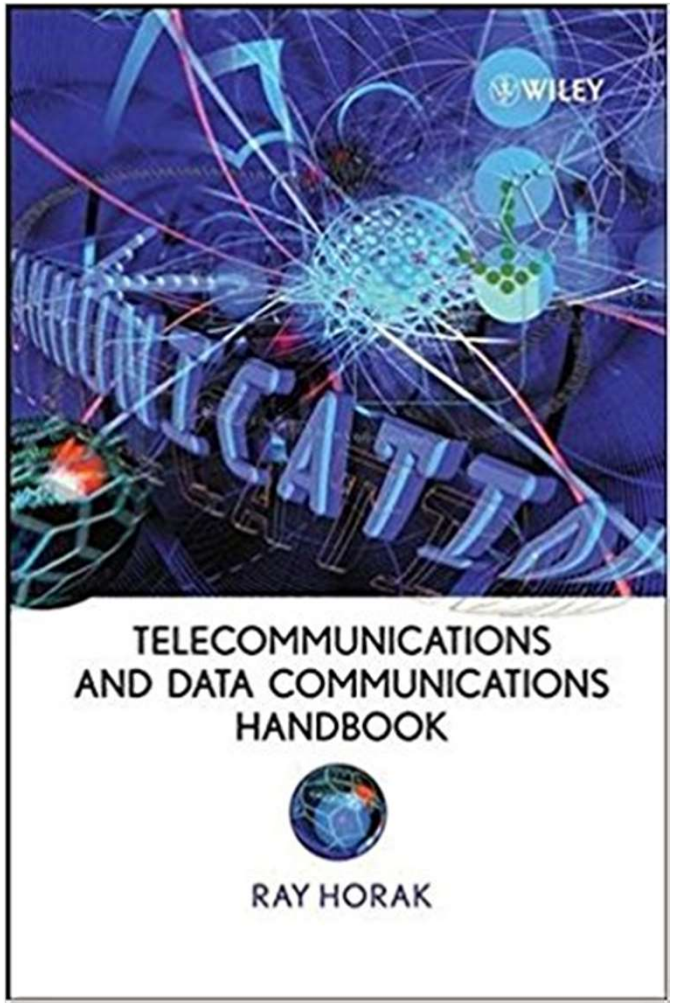
- Elliott D. Kaplan, Editor
- Understanding GPS, Principles and Applications, Artech House, 2005
- GPS Overview
- GPS Systems Segments
- GPS Satellite Signal Characteristics
- Satellite Signal Acquisitions, Tracking, and Data Demodulation
- Interference, Multipath, and Scintillation
- Integration of GPS with other Sensors and Network Assistance



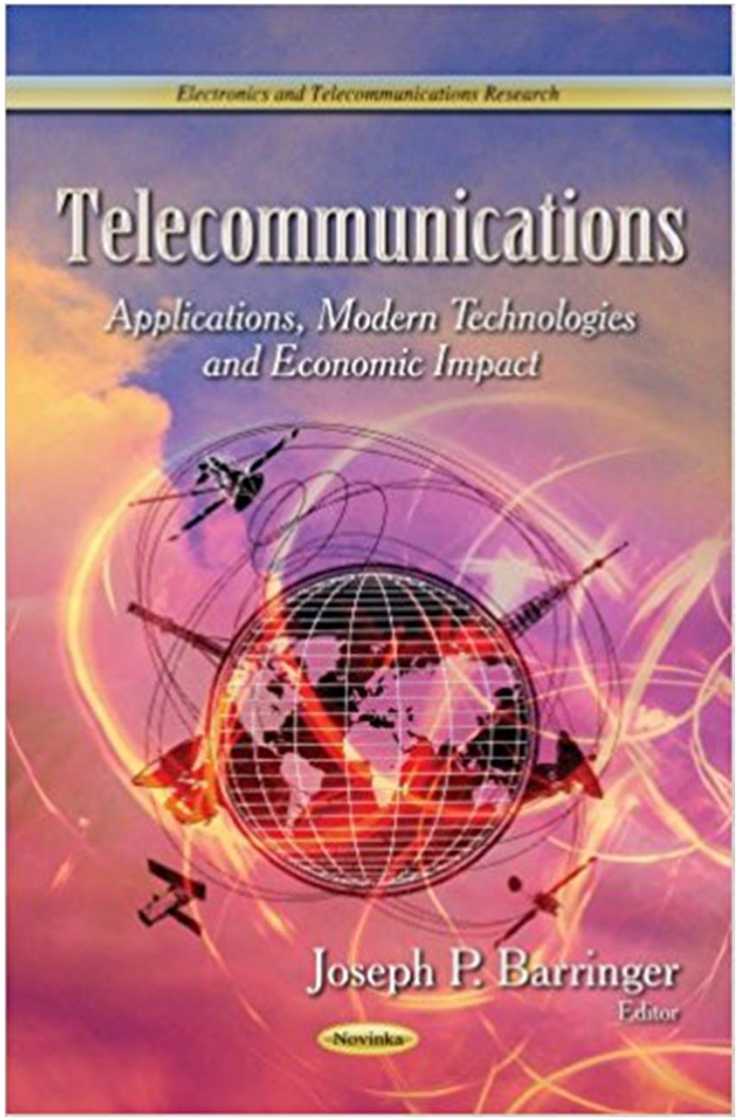
- Lawrence, Harte, Avi, Ofrane, Telecom Systems, PSTN, PBX, Datacom, IP Telephony, IPTV, Wireless and Billing, Althos, 2006.
- This book explains how telecommunications systems and services work and the markets associated with them. Telecommunications technology and services are continually changing. Descriptions and easy to understand diagrams of typical systems and their interconnections are provided for local exchange company (LEC), inter-exchange company (IXC), private telephone exchanges (PBX), computer networks (LANs), data networks (e.g. Internet), billing and customer care systems (BCC). The book starts with a basic introduction to telecom communication. It covers the different types of telecom industries, who controls and regulates them, and provides a basic definition of each of the major telecom technologies.

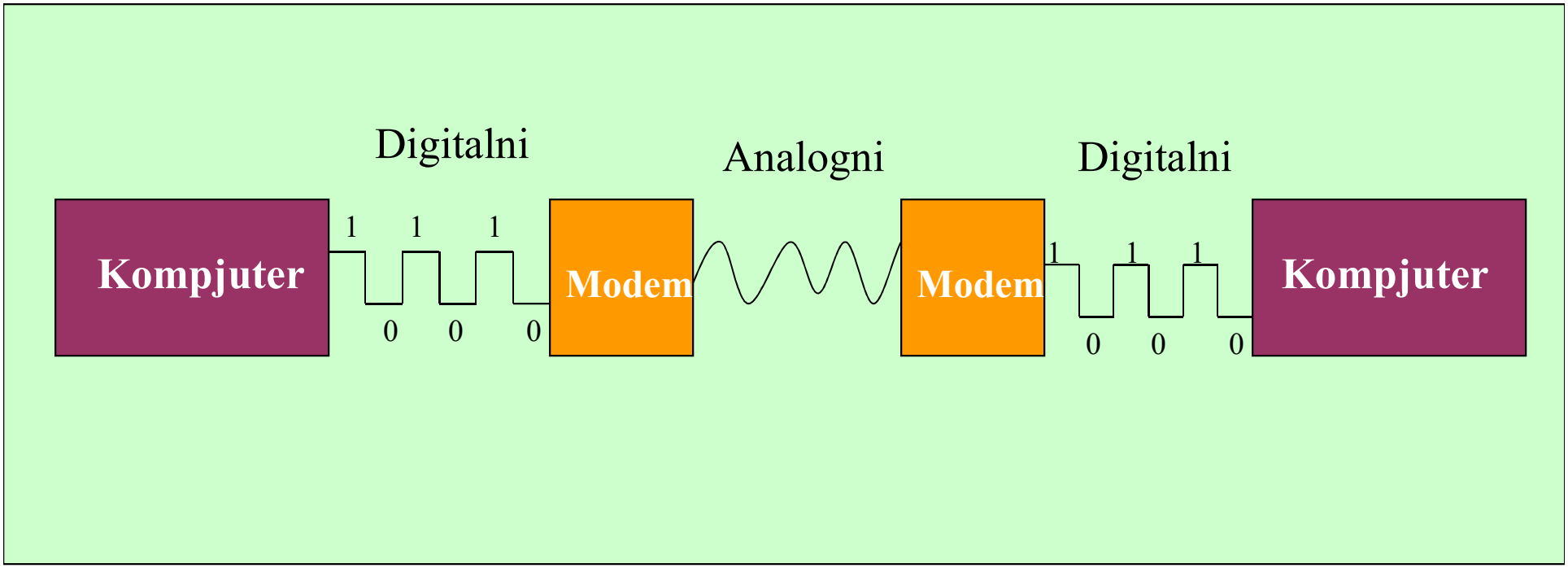


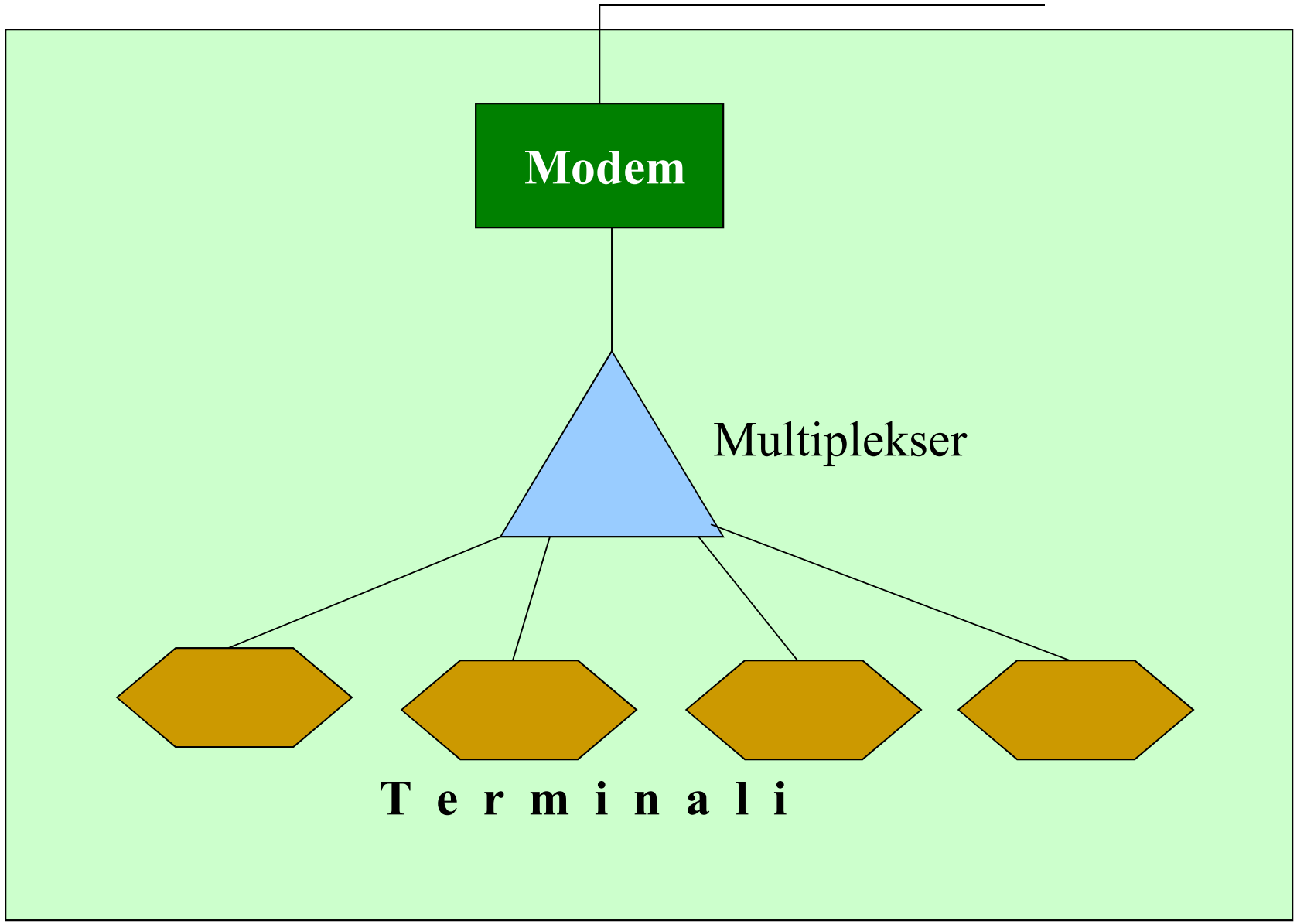
- Ray Horak, Telecommunications and Data Communications Handbook, John Wiley Sons, 2007.



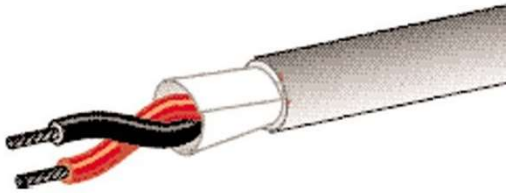
- J. P. Barringer, Editor, Telecommunications: Applications, Modern Technologies and Economic Impact, M. Lutovac, V.Pavlović, V.Mladenović, Computer Algebra and Symbolic Processing in Modern Telecommunication Applications: A New Kind of Survey, Nova Science Publishers, 2014



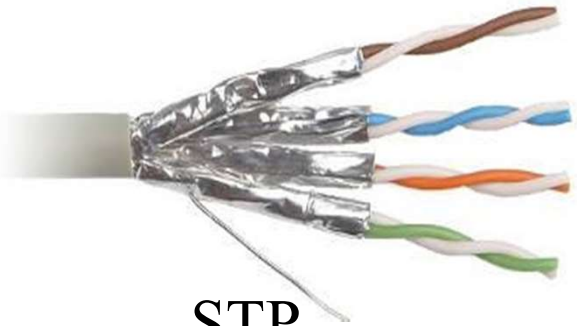

Digitalni
Analogni
Digitalni
Kompjuter
1 1 1
0 0 0
Modem
Modem
1 1 1
0 0 0
Kompjuter


Modem
Multiplekser
T e r m i n a l i

Upredena parica



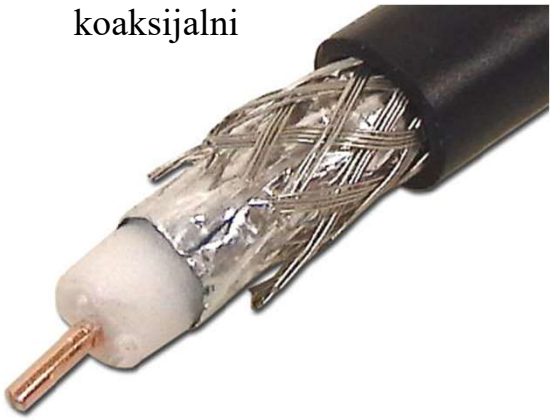
UTP



STP

do 100 m

koaksijalni



do nekoliko stotina m

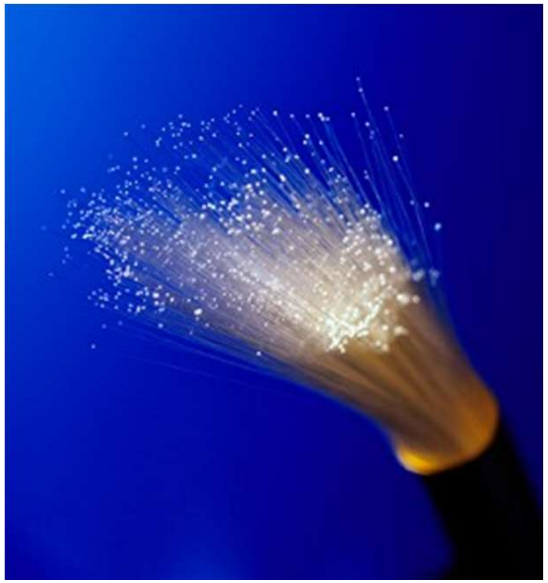
Fiber-optički

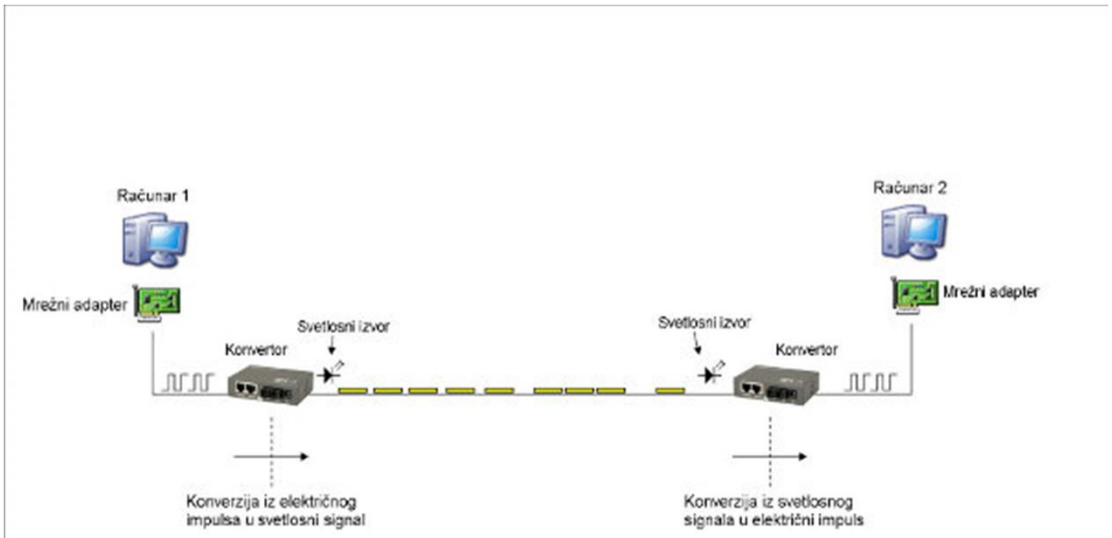
Single-mode kabl

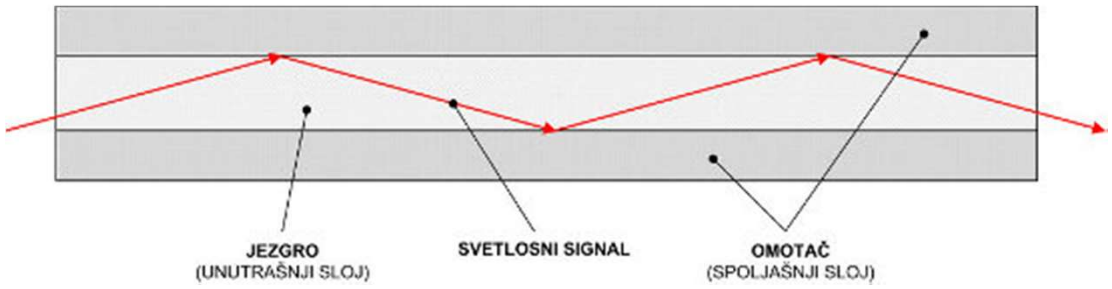
stotine km

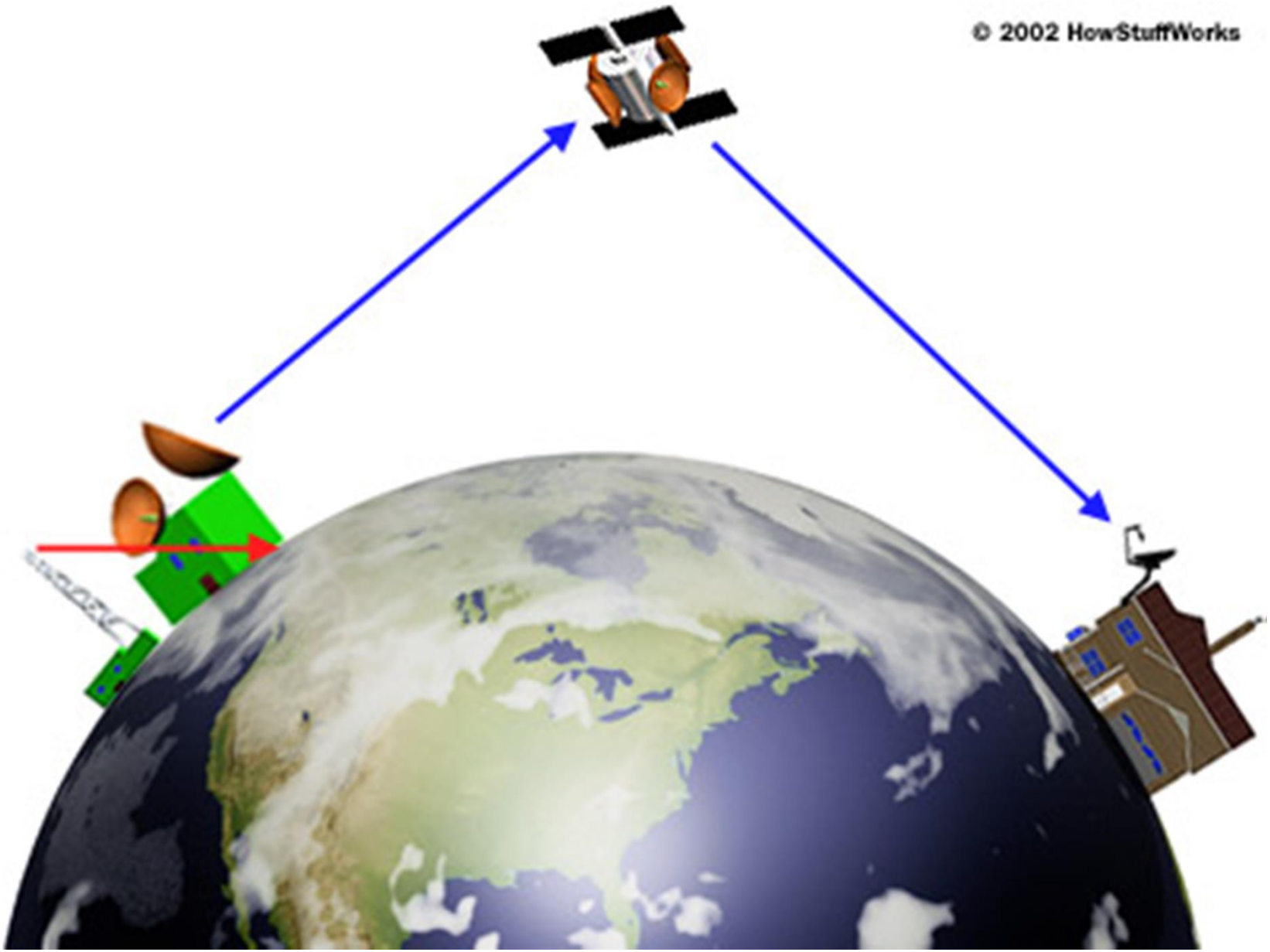
Multi-mode kabl

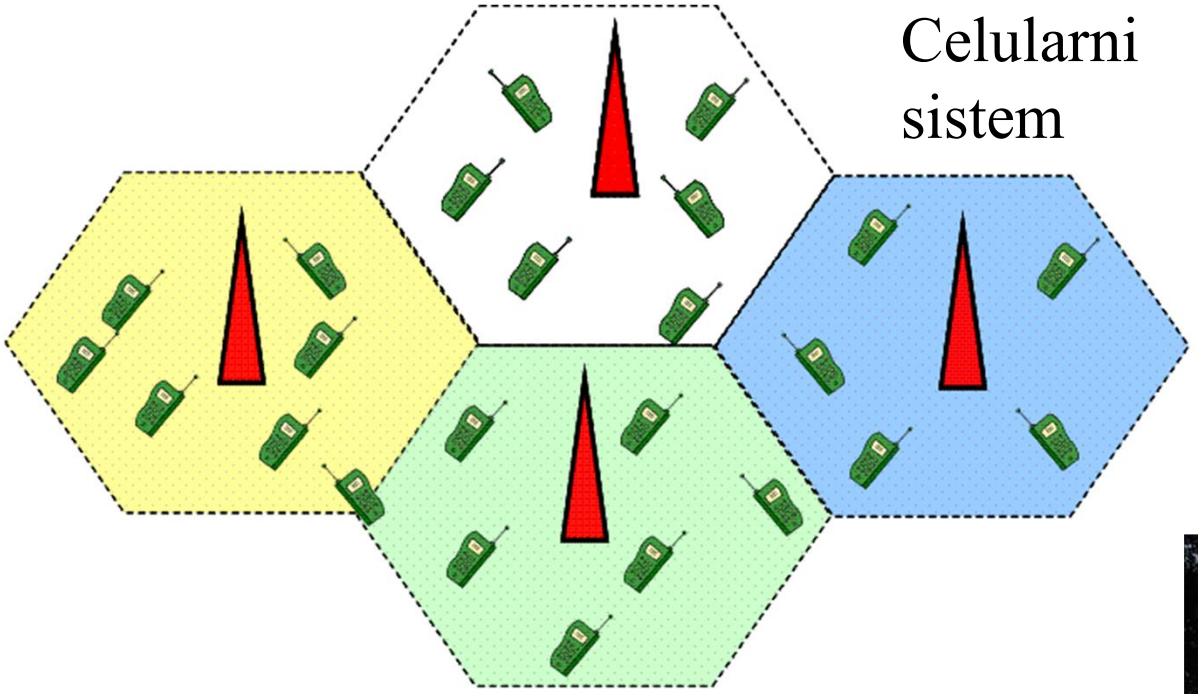
do nekoliko km




Računar 1
Računar 2
Mrežni adapter
Mrežni adapter
Svetlosni izvor
Svetlosni izvor
Konvertor
Konvertor
Konverzija iz električnog impulsa u svetlosni signal
Konverzija iz svetlosnog signala u električni impuls


JEZGRO
(UNUTRAŠNJI SLOJ)
SVETLOSNI SIGNAL
OMOTAČ
(SPOLJAŠNJI SLOJ)


© 2002 HowStuffWorks

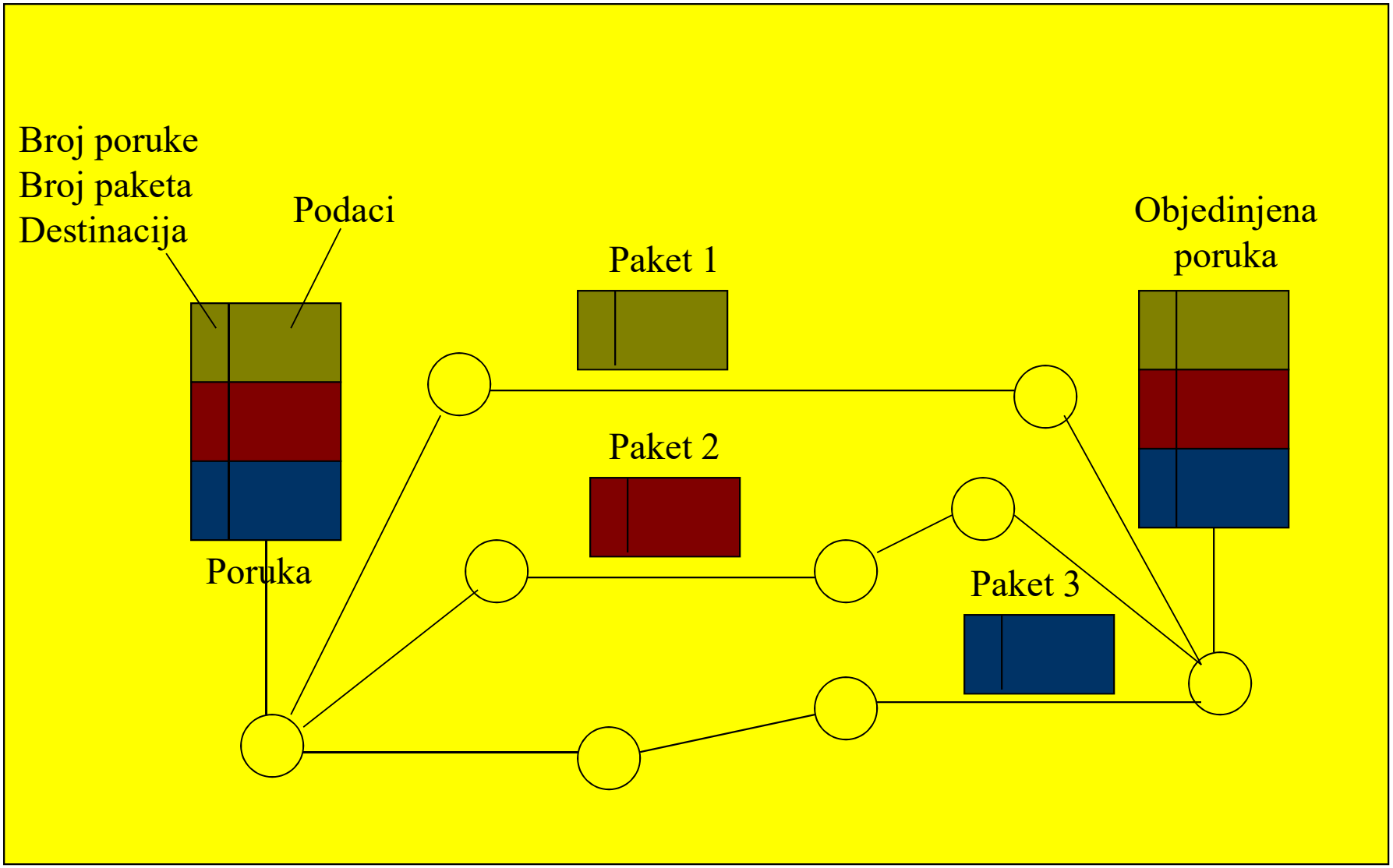


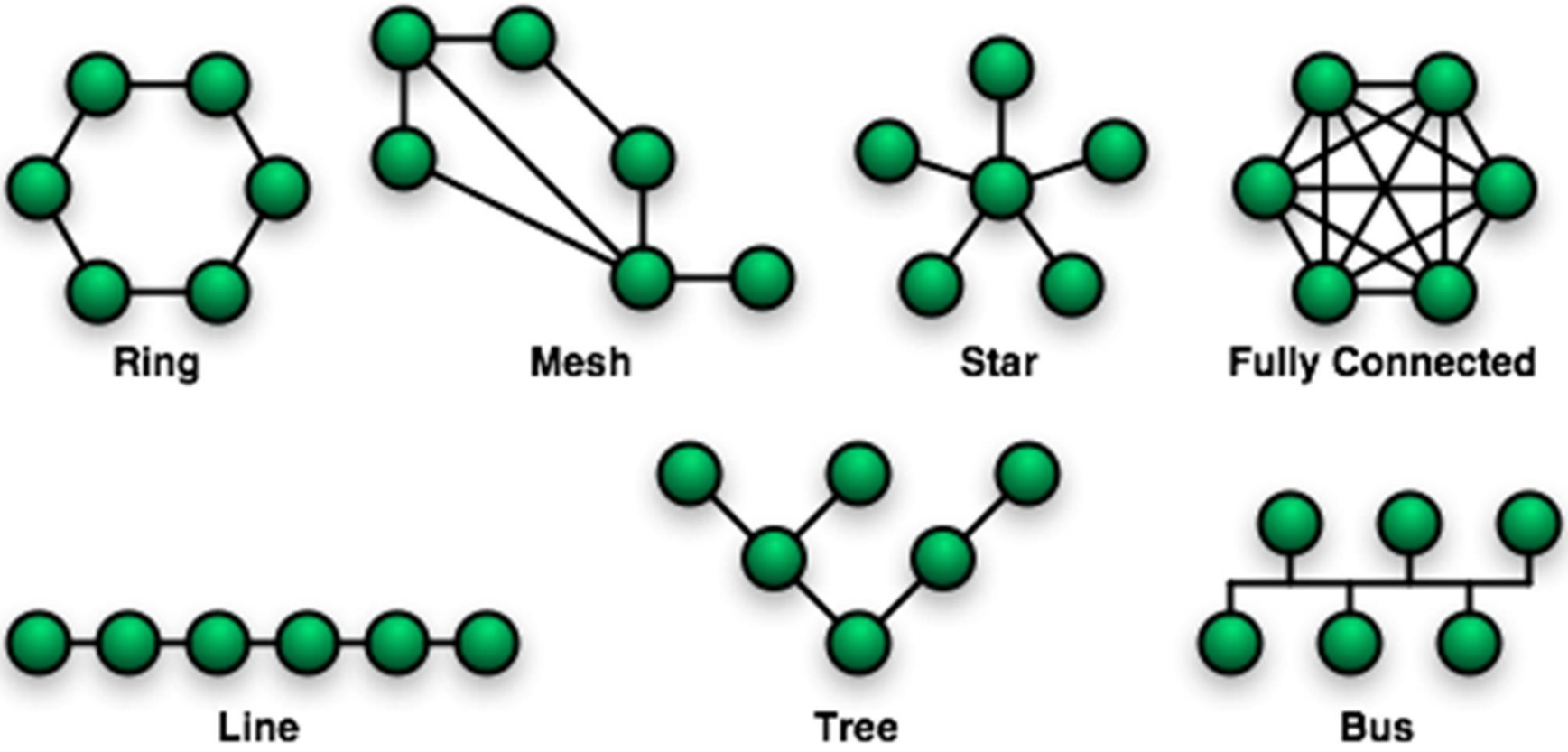
Celularni sistem

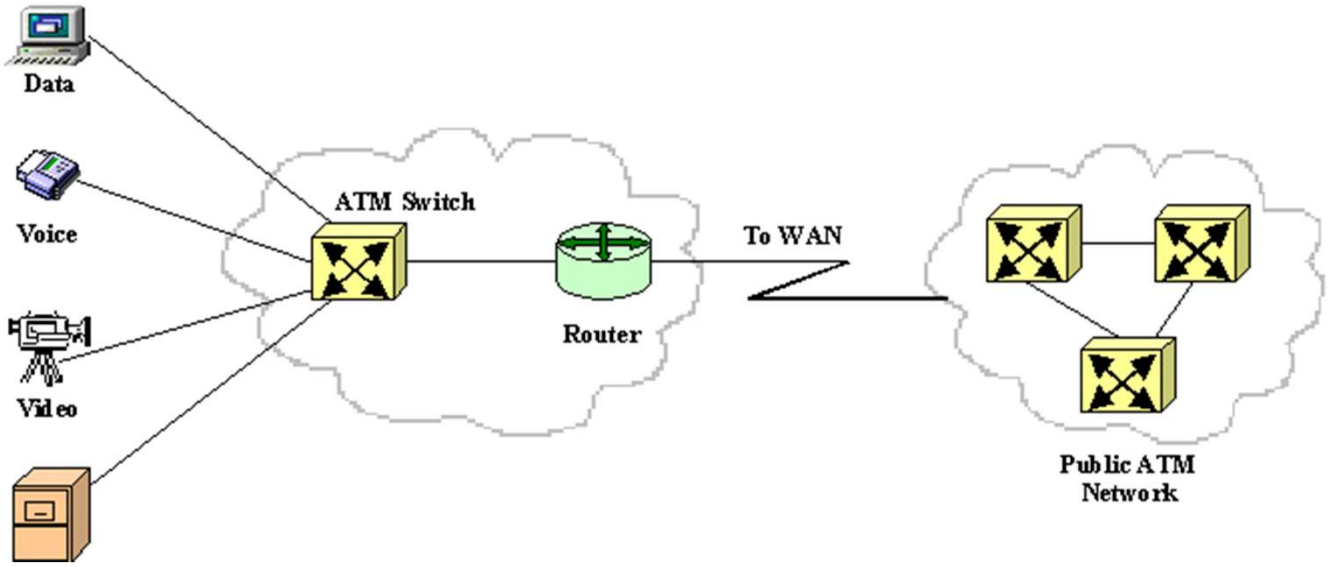
PCS relejna antena


To internet
Cable modem
Wireless router
Desktop with PCI wireless adapter
Laptop with wireless adapter card

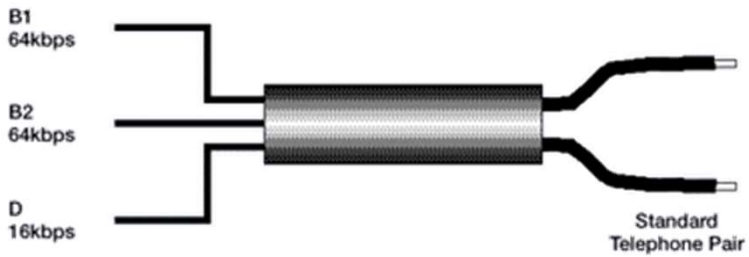

NOKIA
Ovi Mail
Back
Inbox
by Date
Your.fav.forum@forum.com
New post by J_23
18:23
Your.fav.forum@forum.com
New post by Tom_U
17:03
John.Smith@Company.com
As per our telephone conversation
16:46
Anna_Johnson@email.com
My new dog!!!
16:30
Options

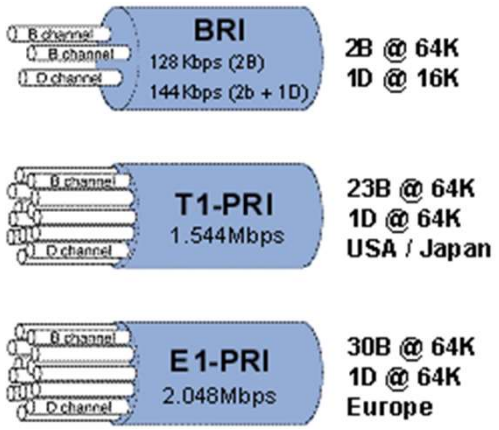

Broj poruke
Broj paketa
Destinacija
Podaci
Paket 1
Objedinjena
poruka
Paket 2
Poruka
Paket 3


Ring
Mesh
Star
Fully Connected
Line
Tree
Bus

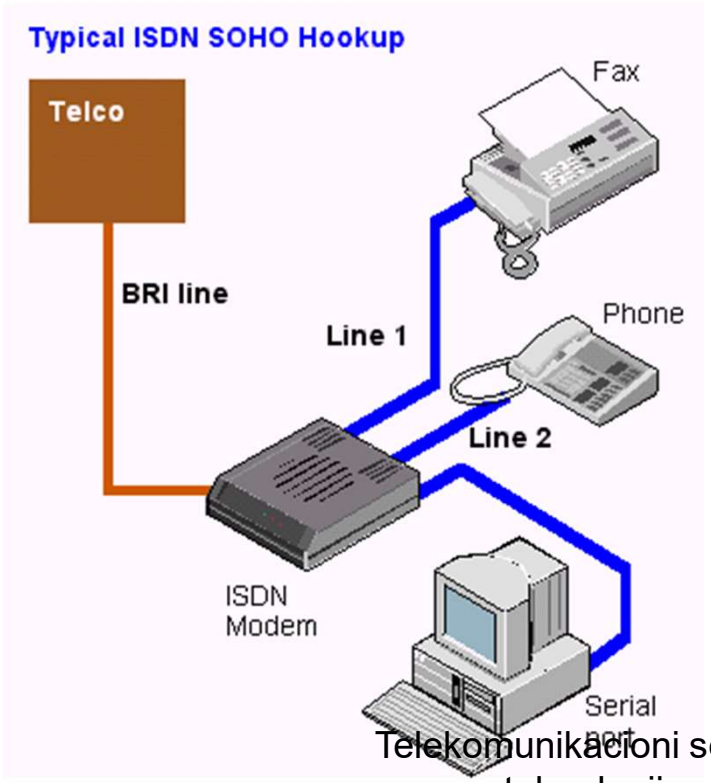

Data
Voice
Video
ATM Switch
Router
To WAN
Public ATM
Network

ISDN

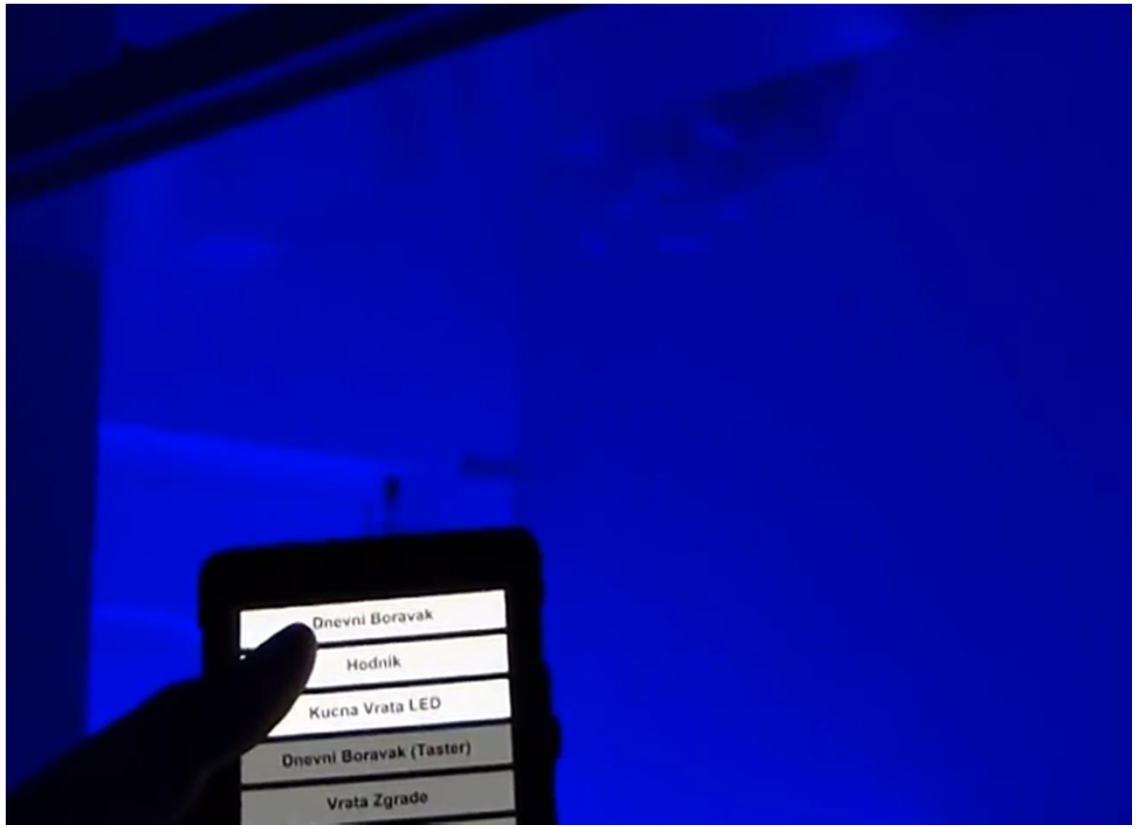


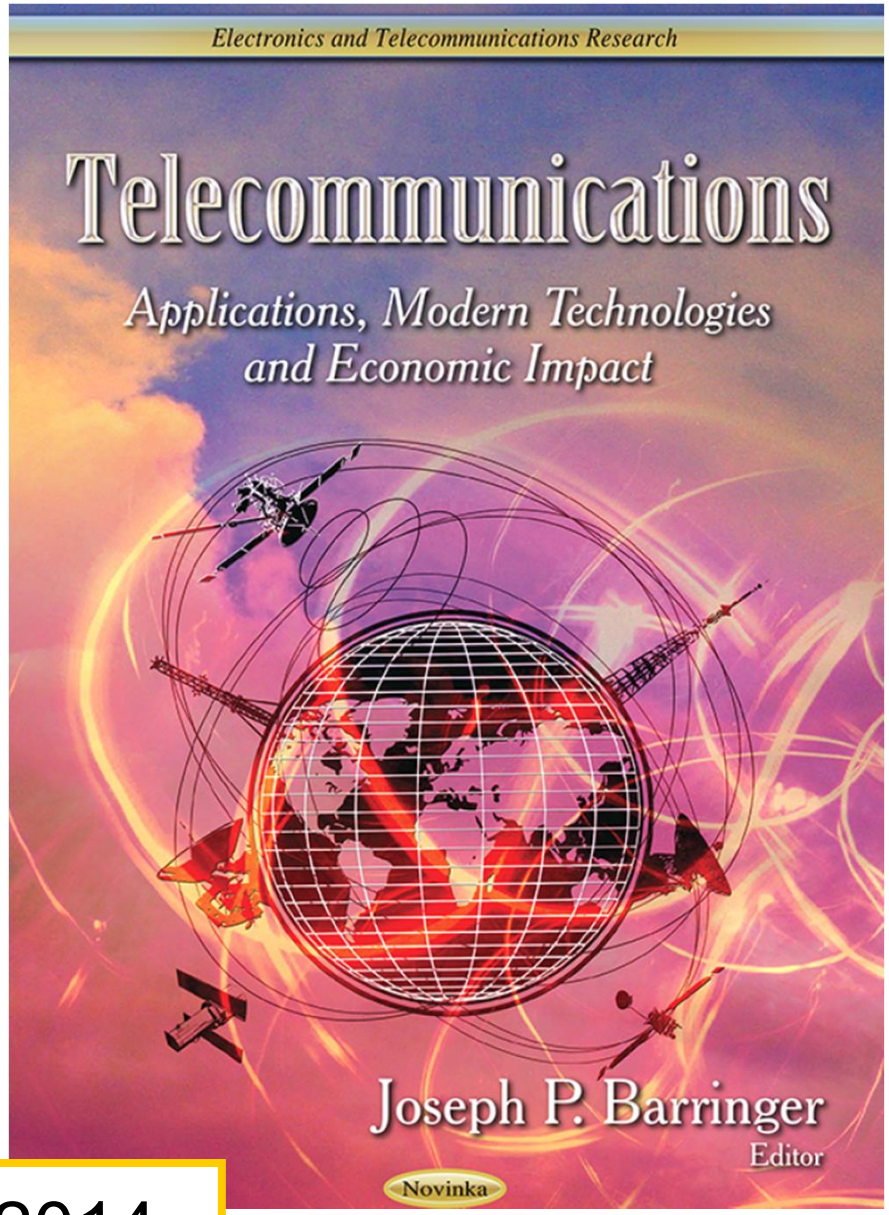


From Computer Desktop Encyclopedia
© 1999 The Computer Language Co. Inc.



- **Near field communication** (NFC) is a set of communication protocols that enable two electronic devices, one of which is usually a portable device such as a smartphone, to establish communication by bringing them within 4 cm of each other





Electronic Communications Services in the world of apps: Regulatory Challenges

2014

Constantly changing

- Market for telecommunications networks
- Services
- Regulatory approach
- Technological progress creates new challenges
- Traditional and new operators and service
- Smart-phones: customers have constant access to a computer, irrespective of time and place; they can retrieve information from the internet, read messages and get in touch with friends and business partners

Communication now

- takes place through a multitude of technologies
- Telephone
- Text message (SMS)
- iMessage
- MMS
- Social networks (Facebook)
- Messaging apps (WhatsApp, Viber- HD-quality phone calls, Skype)
- Customer can decide which communications service to select

Competing

- The network operator's services are therefore competing directly with all the other communications services that are downloaded from the internet by the customer or pre-installed by the terminal device manufacturer
- "world market" rather than national markets

Providers vs network operators

- Austria or Germany: smartphone penetration of 36%
- Service segment exists independently of the network operators
- Providers give access to networks, and leave the business of offering service to the application providers

Directive on electronic commerce

- Lack of clarity in relation to the application of the country-of-origin principle
- Providers of applications are to be classified as operators of electronic communications services

Engineering Designer Tasks and Activities

- To apply scientific and engineering knowledge to the solution of technical problems
- To optimize solutions within the requirements and constraints set by technological, economic, legal, and environmental considerations
- Designers - design and development engineers
- Systematic
- Organizational - market need or a new idea
- Novelty - original designs incorporate new solution principles
- Adaptive design, Trends

Telecommunication applications

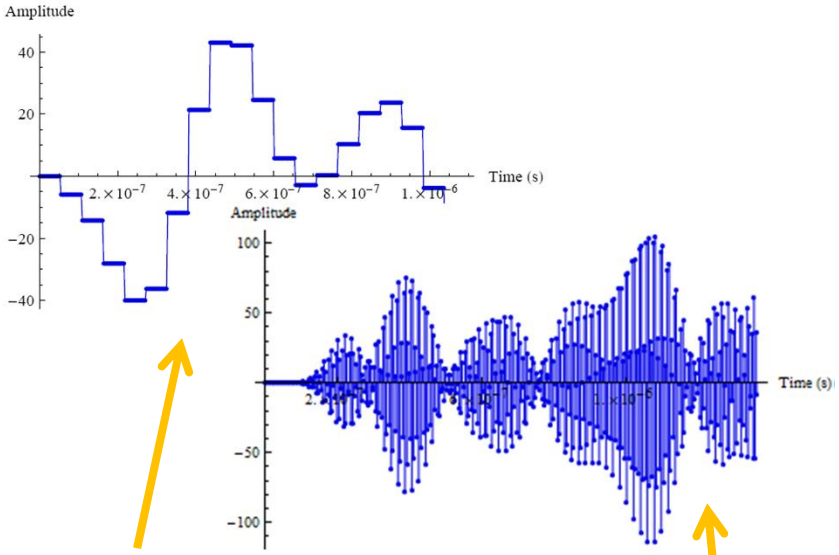
- Methods to solve **practical problems**
- Organizes and makes intelligible **field of knowledge**
- Part of a **logical structure**
- Understand the **structures**
- **Numerical-only** algorithms – **drawback**:
  - Generating tremendous amount of numerical data
  - lose insight into the phenomenon being investigated
  - final results
    - Accuracy
    - Execution time of numerical algorithm
    - Efficiency-based reasoning

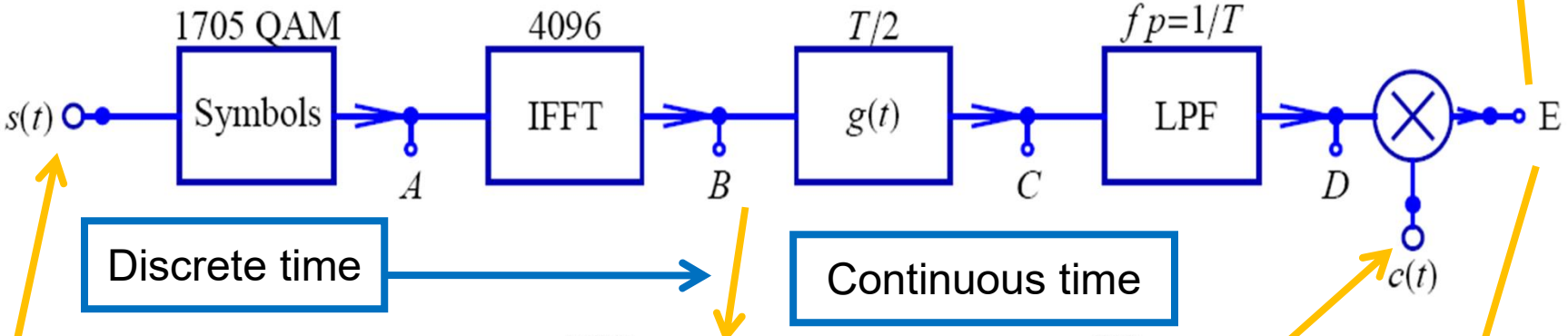
Speeding up in design and analysis

Significantly increasing of processor's power and higher storage space:

- **Low**-complexity implementation into **high**-complexity **structures**
- Expert-based **knowledge**
  - theory of systems
  - signal processing
  - telecommunications
  - software engineering

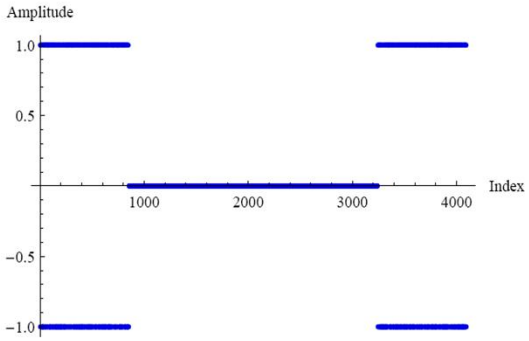
Simulation of OFDM **transmitters**

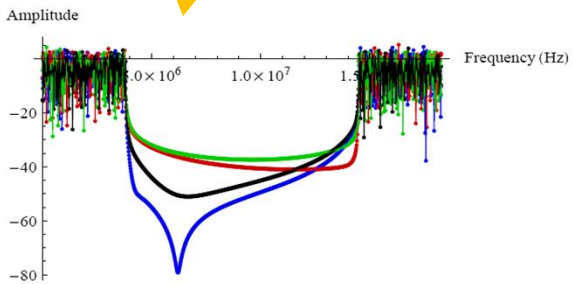


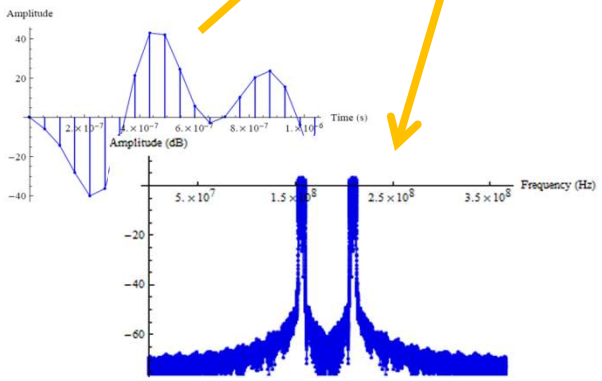


Discrete time

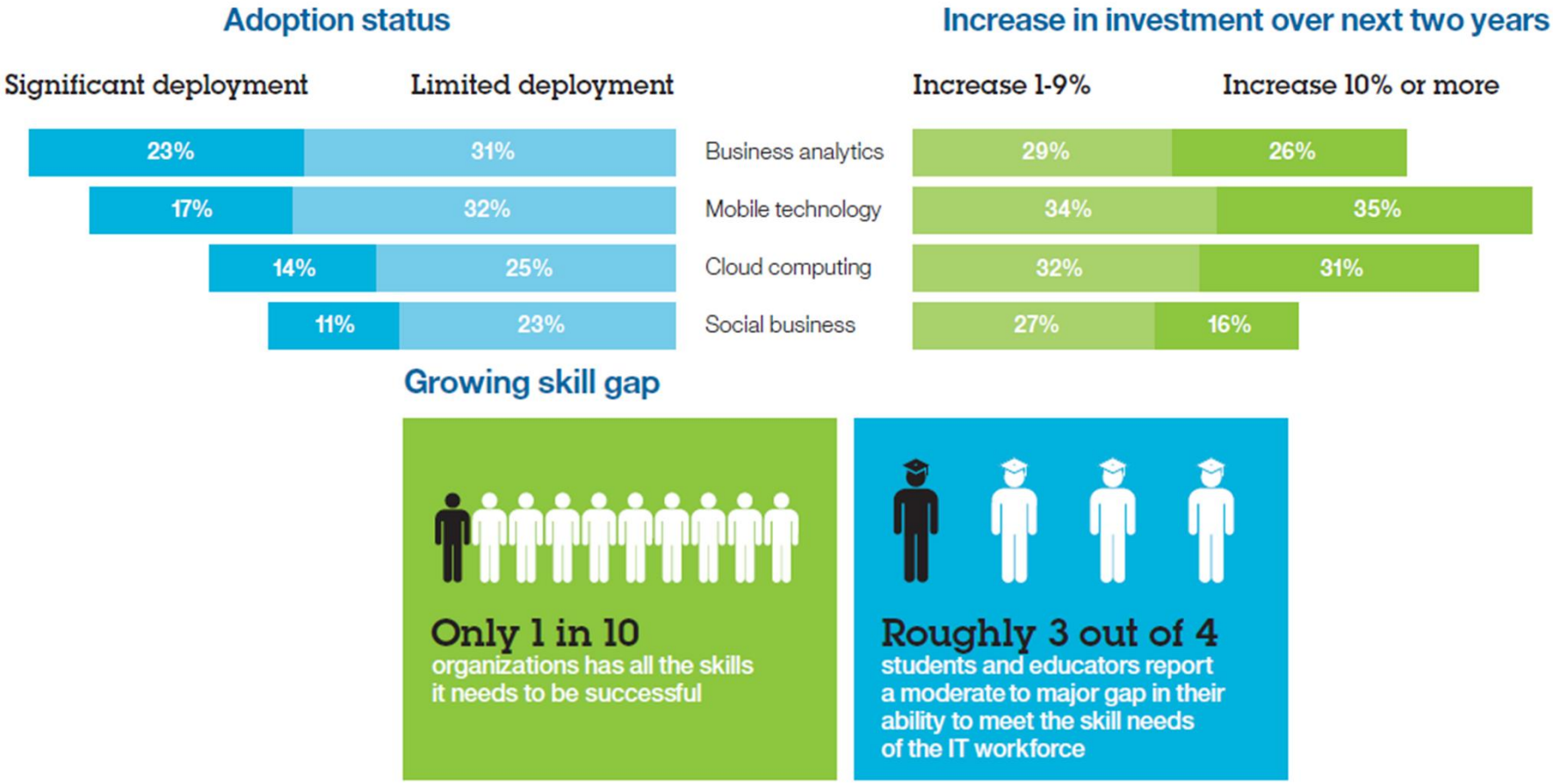
Continuous time

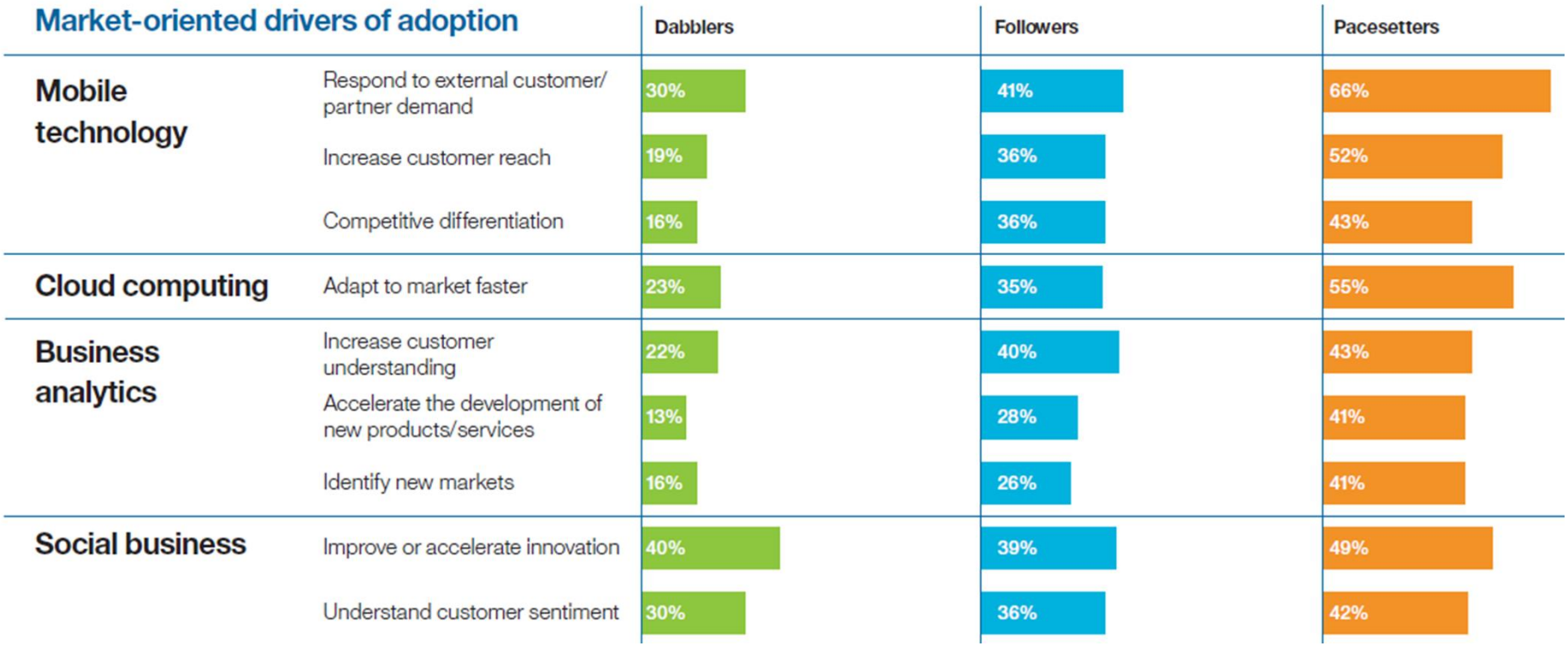






mobile and cloud top targets for investment




Market-oriented drivers of adoption
Dabblers
Followers
Pacesetters
Mobile technology
Respond to external customer/ partner demand
30%
41%
66%
Increase customer reach
19%
36%
52%
Competitive differentiation
16%
36%
43%
Cloud computing
Adapt to market faster
23%
35%
55%
Business analytics
Increase customer understanding
22%
40%
43%
Accelerate the development of new products/services
13%
28%
41%
Identify new markets
16%
26%
41%
Social business
Improve or accelerate innovation
40%
39%
49%
Understand customer sentiment
30%
36%
42%

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Ova prezentacija je nekomercijalna.
Slajdovi mogu da sadrže materijale preuzete sa Interneta, stručne i naučne građe, koji su zaštićeni Zakonom o autorskim i srodnim pravima.
Ova prezentacija se može koristiti samo privremeno tokom usmenog izlaganja nastavnika u cilju informisanja i upućivanja studenata na dalji stručni, istraživački i naučni rad i u druge svrhe se ne sme koristiti –
Član 44 - Dozvoljeno je bez dozvole autora i bez plaćanja autorske naknade za nekomercijalne svrhe nastave:
(1) javno izvođenje ili predstavljanje objavljenih dela u obliku neposrednog poučavanja na nastavi;
- ZAKON O AUTORSKOM I SRODNIM PRAVIMA ("Sl. glasnik RS", br. 104/2009 i 99/2011)