



Zavod za telekomunikacije

Poslijediplomski studij  
za stjecanje doktorata  
znanosti

Ak.g. 2009./2010.

# Projektiranje telekomunikacijskih sustava

Nova generacija mreža

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- ◆ Sljedeća generacija mreža  
(NGN - *Next Generation Network*)
- ◆ Dugoročna evolucija  
(LTE – *Long Term Evolution*)
- ◆ Budući Internet  
(FI - *Future Internet* )
- ◆ Kontekstno-svjesne usluge  
(*Context-aware Services*)
- ◆ Mrežni operator nove generacije (*Telco 2.0*)

# NGN

## ◆ Arhitektura “tradicionalne” mreže: vertikalna

- svaka mreža ima svoje resurse (npr. fiksna - telefonska, pokretna, kabelaška televizija, Internet)
- niska razina zajedničkih resursa, pretežno prijenosnih (npr. pristup Internetu putem telefonske mreže, povezivanje čvorova pokretne mreže prijenosnim sustavima fiksne mreže)
- različiti načini komuniciranja (kanal, paket), s pretvorbama između mreža

## ◆ Arhitektura “nove” mreže: horizontalna

- sve mreže se zasnivaju na visokoj razini zajedničkih resursa, prijenosnih, kontrolnih i uslužnih
- prevladava paketski načini komuniciranja

# Horizontalna mrežna arhitektura (1)



Uslužni sloj (*Service Layer*)

Otvorene platforme:  
aplikacijska  
programska sučelja

Kontrolni sloj (*Control Layer*)

Žična pristupna mreža

Optička pristupna mreža

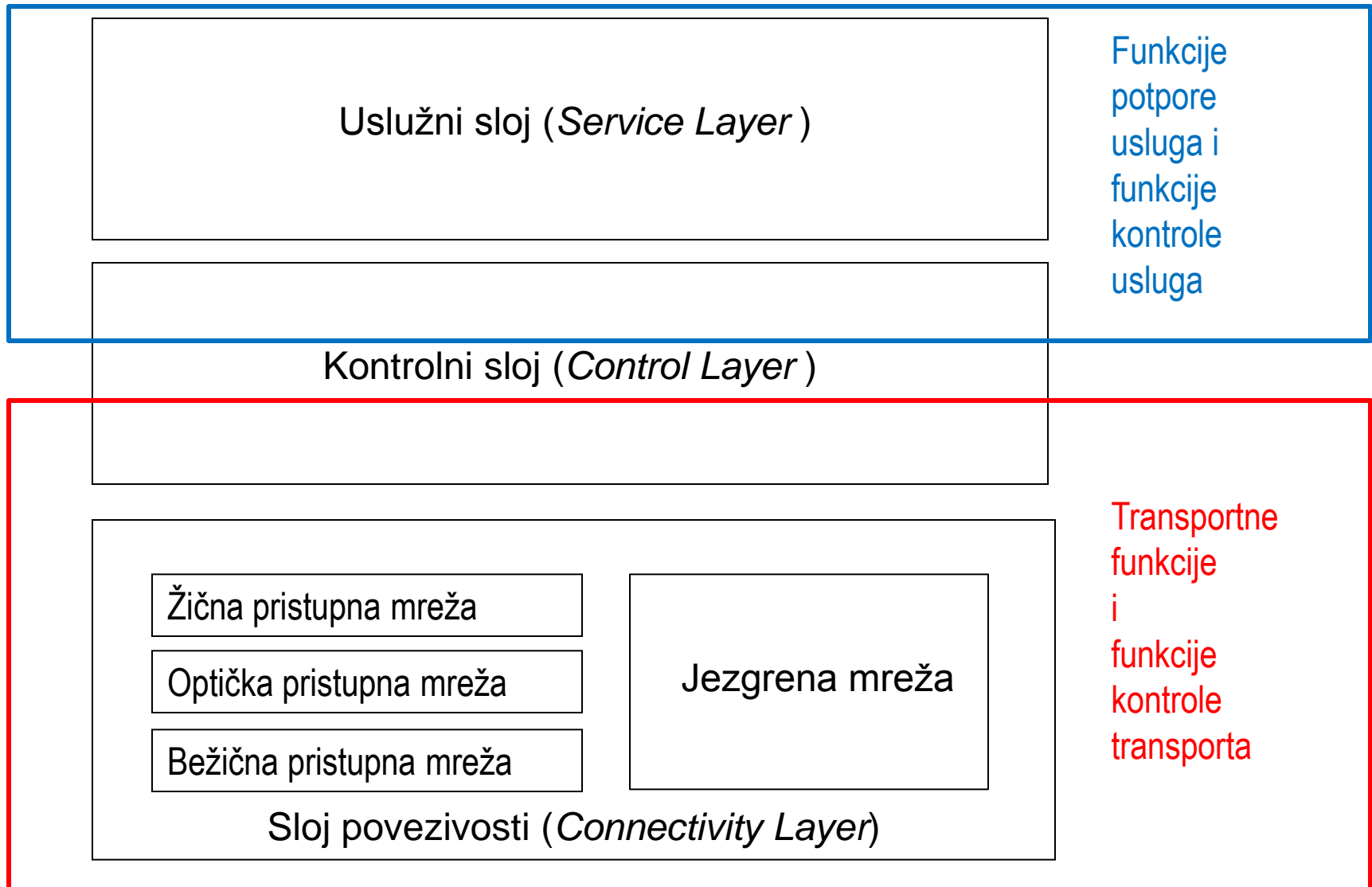
Bežična pristupna mreža

Jezgrena mreža  
(*Core Network*)

Sloj povezivosti (*Connectivity Layer*)

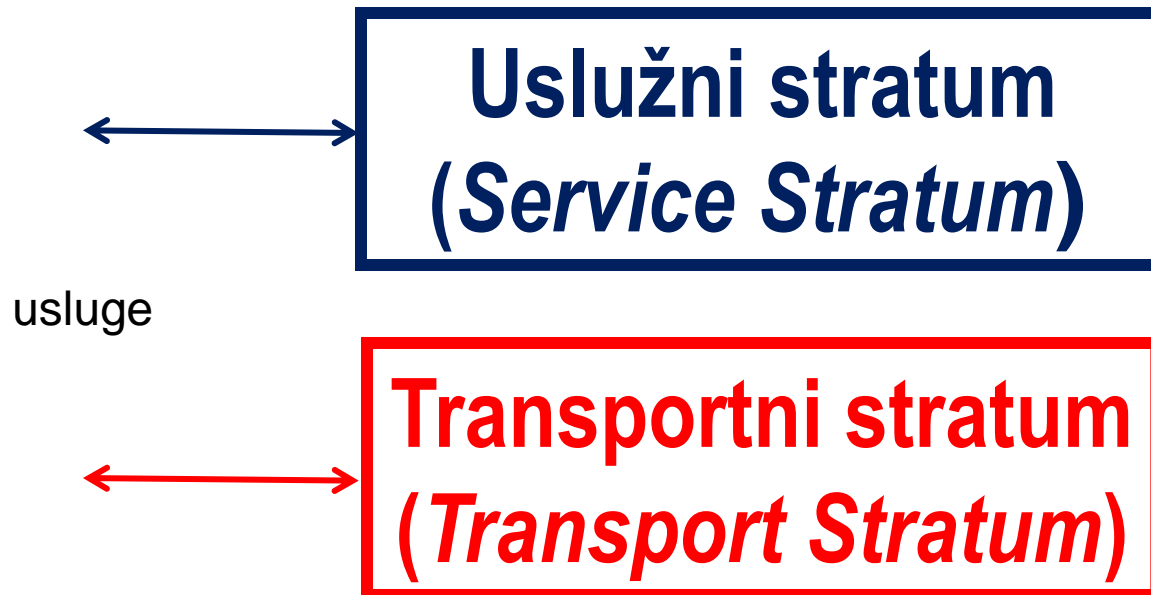
Jedinstvena  
mrežna  
tehnologija:  
paketska mreža  
zasnovana na  
protokolu IP

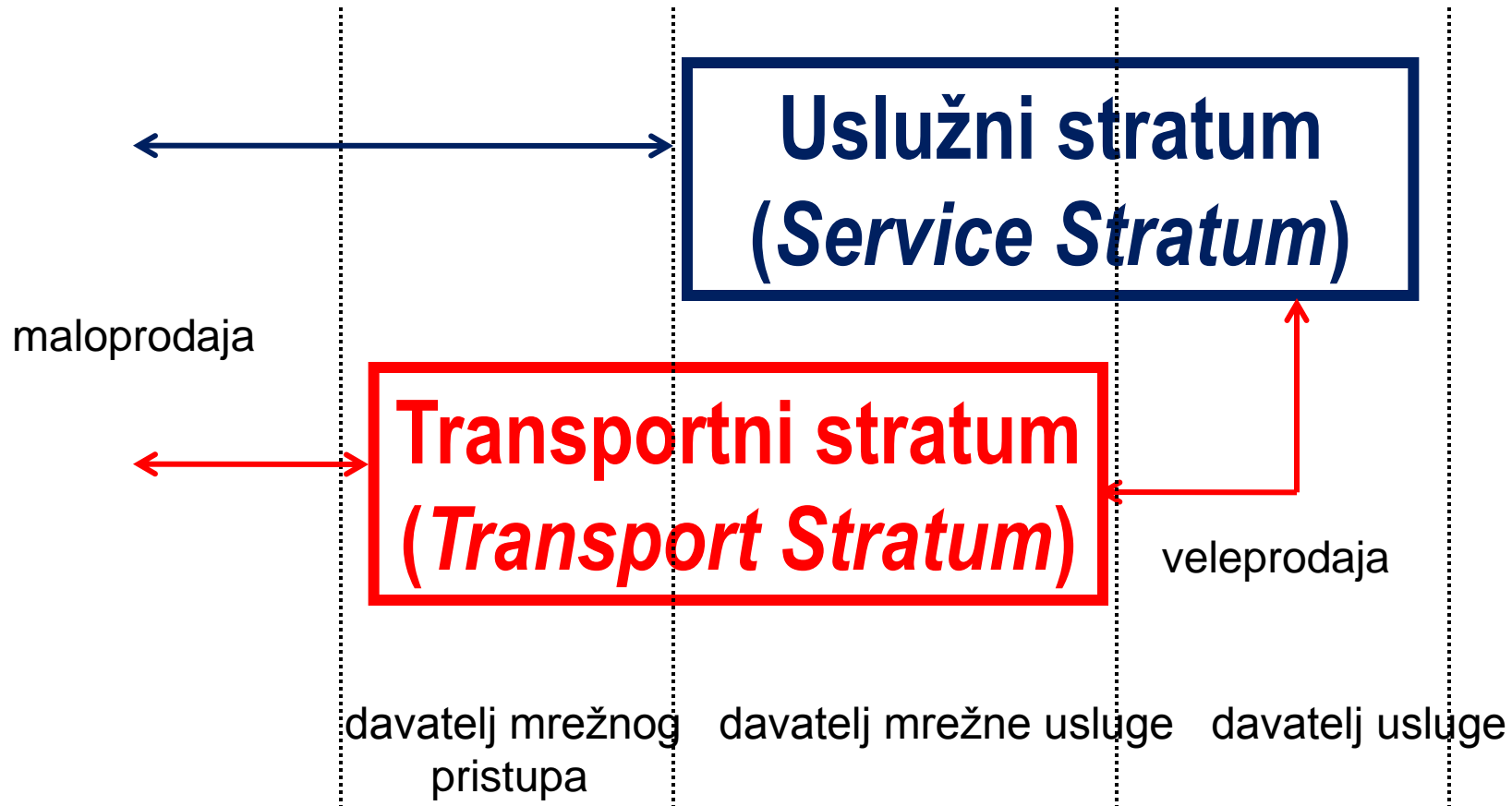
# Horizontalna mrežna arhitektura (2)



## *Next Generation Network, NGN*

- ◆ Paketski zasnovana mreža koja omogućuje uporabu višestrukih širokopojasnih tehnologija s potporom za kvalitetom usluge u kojoj su uslužne funkcije neovisne o transportnim tehnologijama. → IP-mreža
- ◆ Omogućuje nesputani korisnički pristup mrežama i konkurentskim davateljima usluga. → žična, bežična i optička pristupna mreža
- ◆ Podržava neograničenu pokretljivost koja omogućuje konzistentno i sveprisutno pružanje usluga. → stacionarno, nomadsko i pokretno komuniciranje





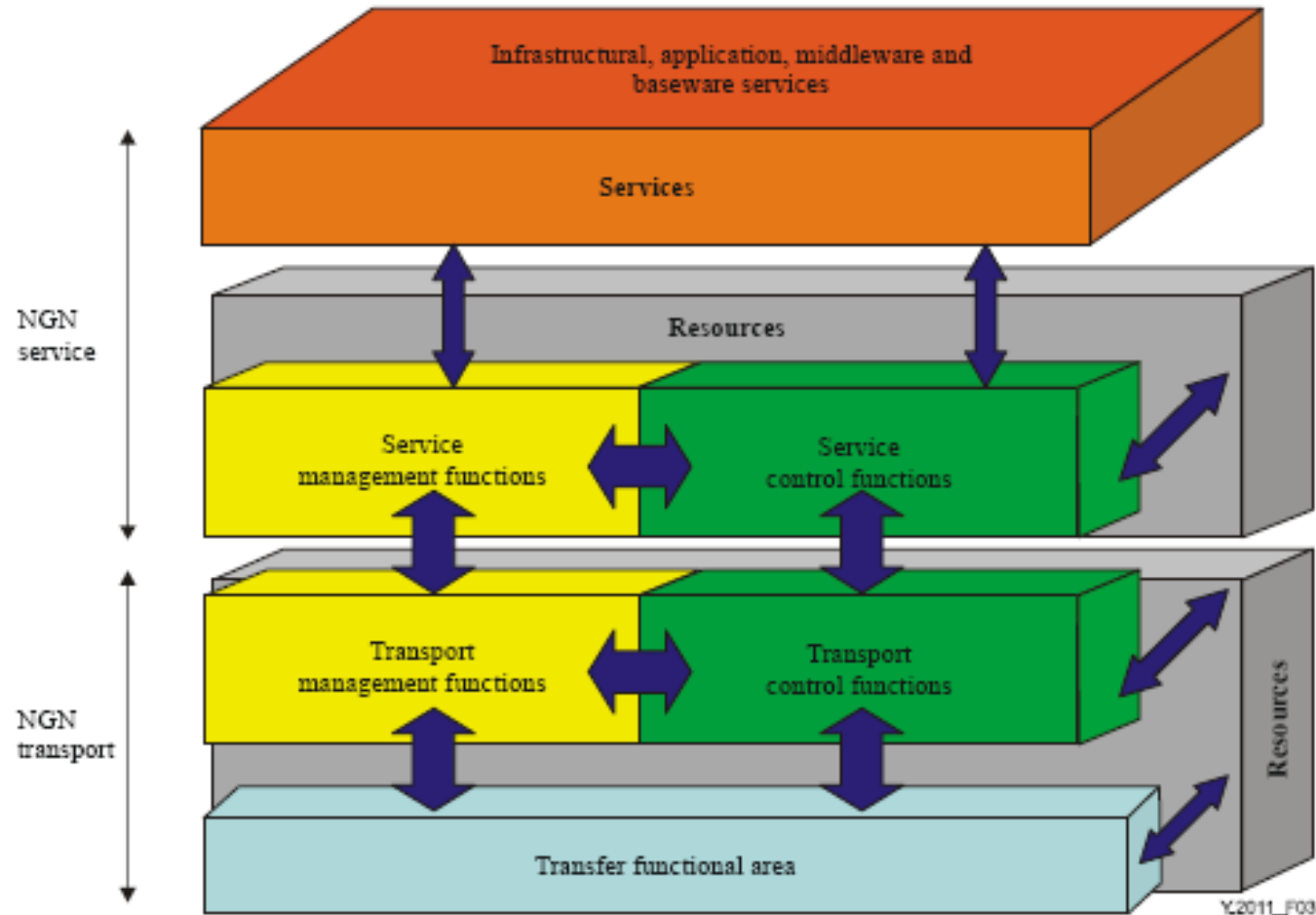


Figure 3/Y.2011 – General functional model

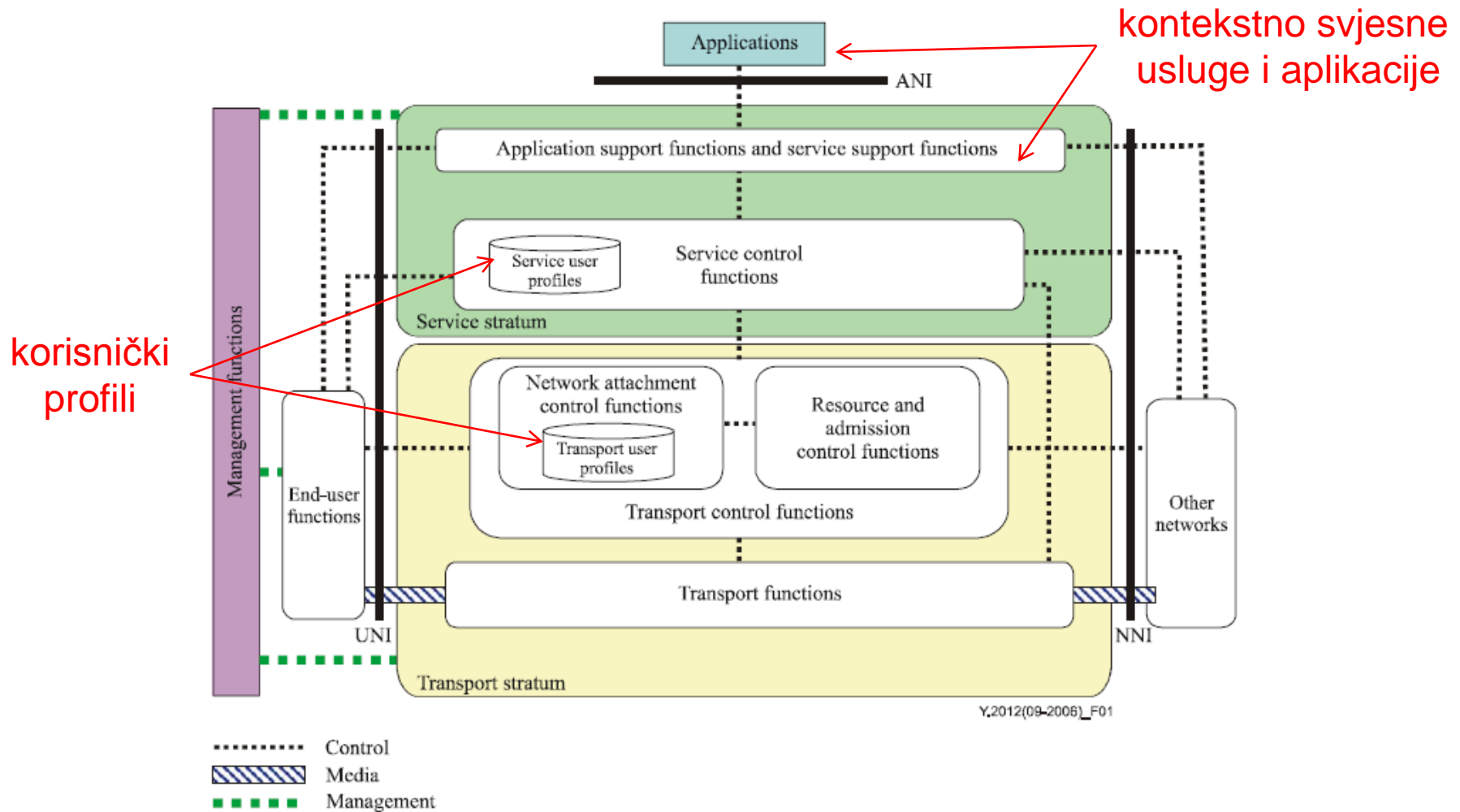
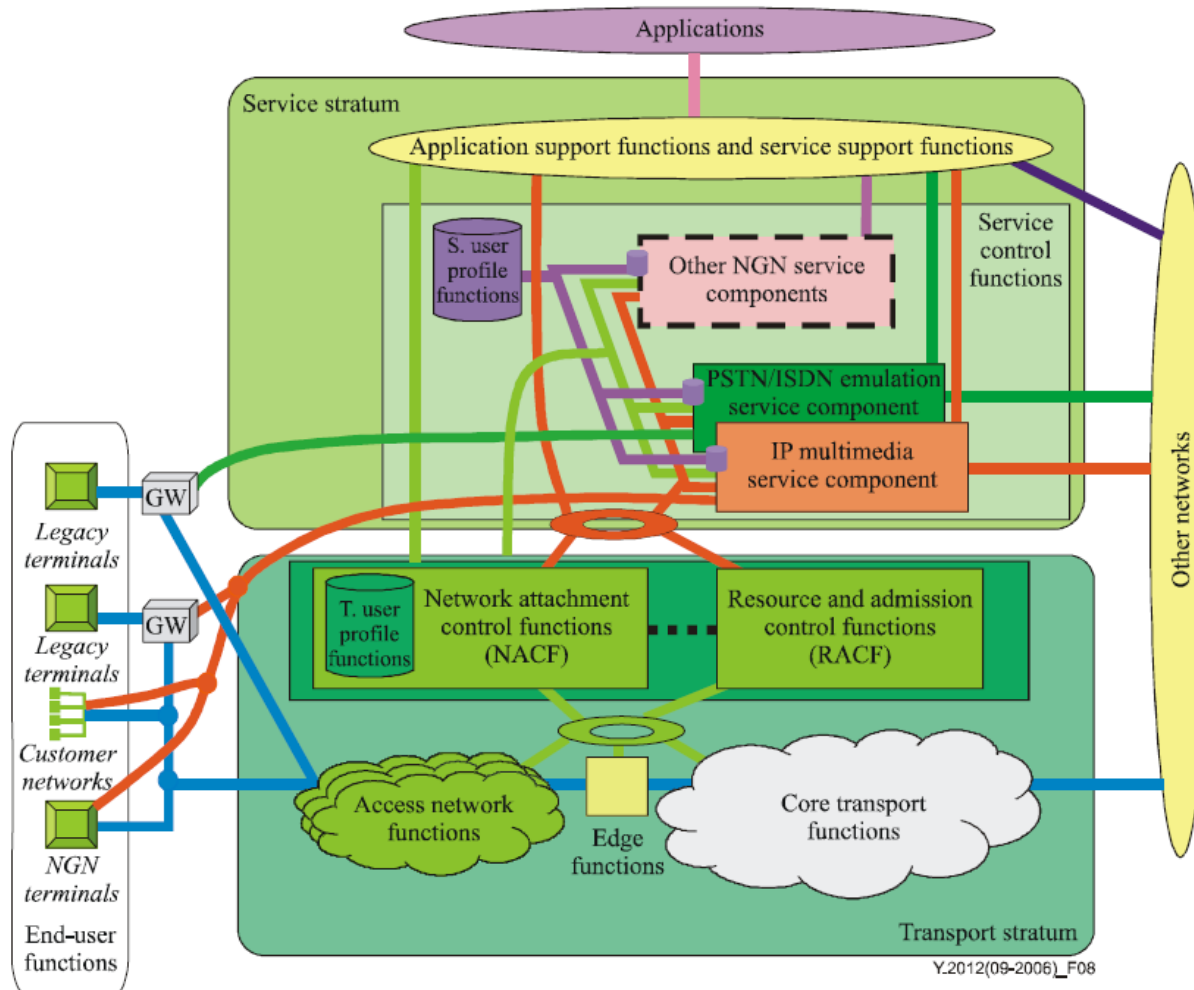
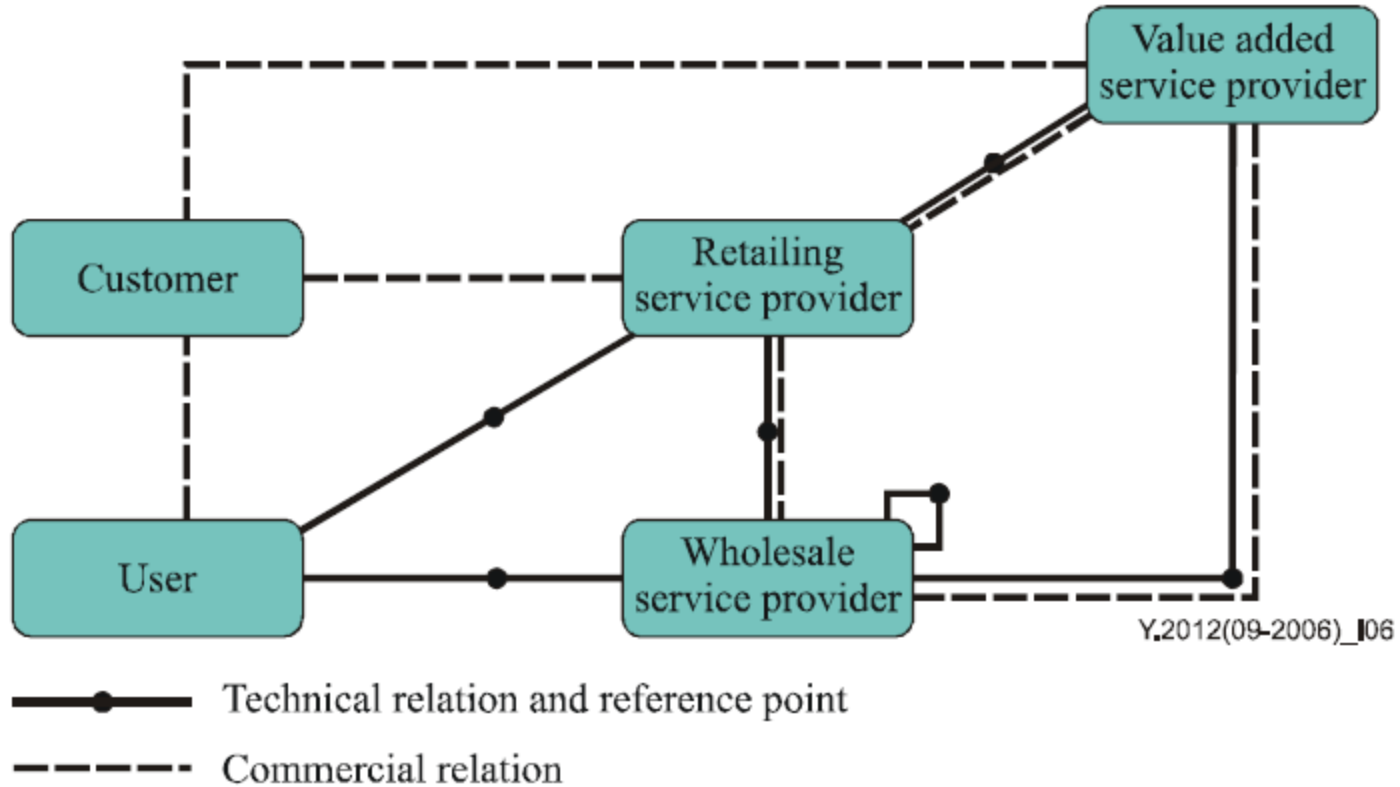


Figure 1 – NGN architecture overview



NOTE – Gateway (GW) may exist in either transport stratum or end-user functions.

**Figure 8 – NGN components**



**Figure I.6 – Basic NGN roles**

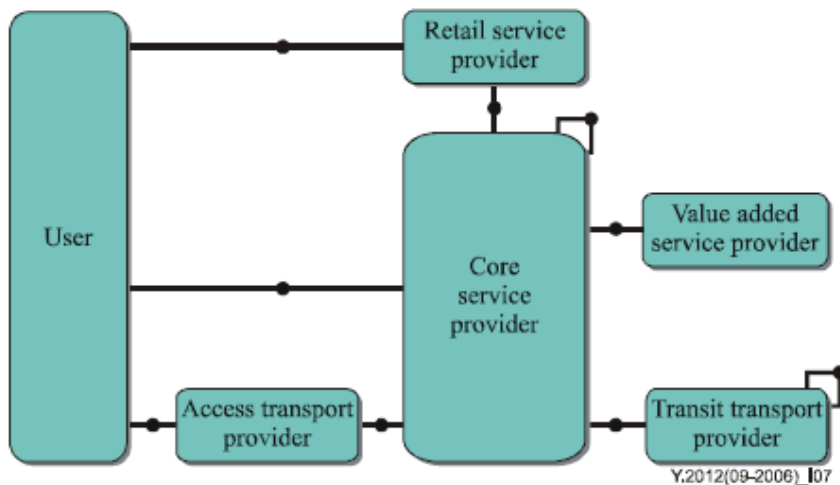


Figure I.7 – NGN roles: First level of specialization

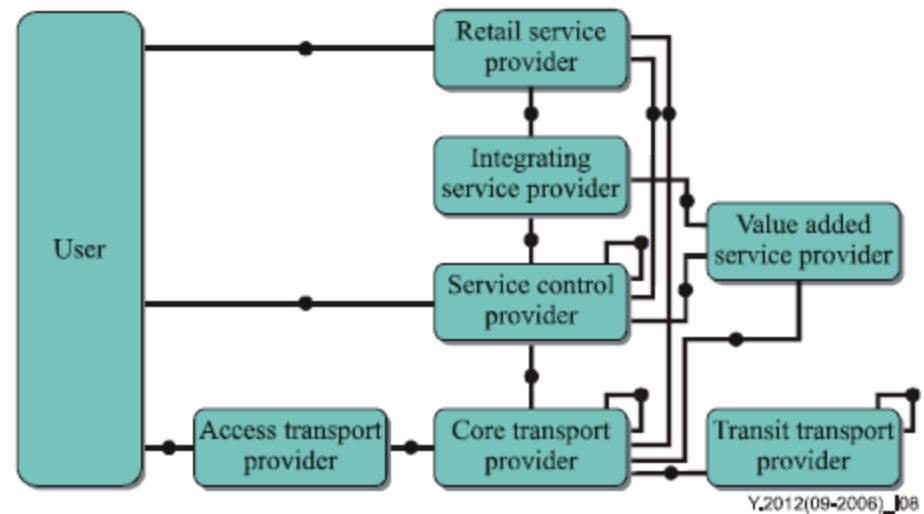
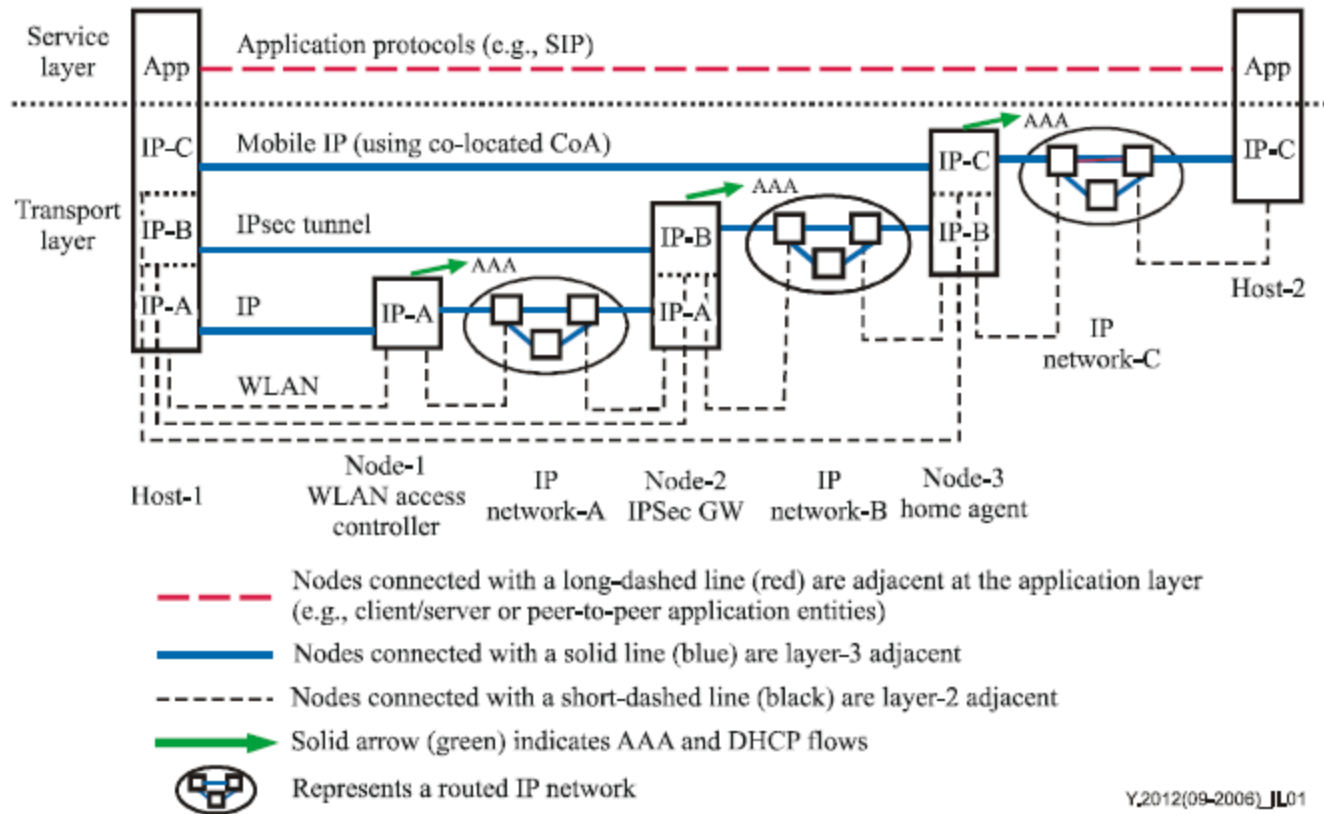


Figure I.8 – NGN roles: Second level of specialization

# Primjer 1: višeslojni transportni stratum



**Figure II.1 – Multi-layered transport stratum**

# Primjer 2: pristupna i jezgrena mreža

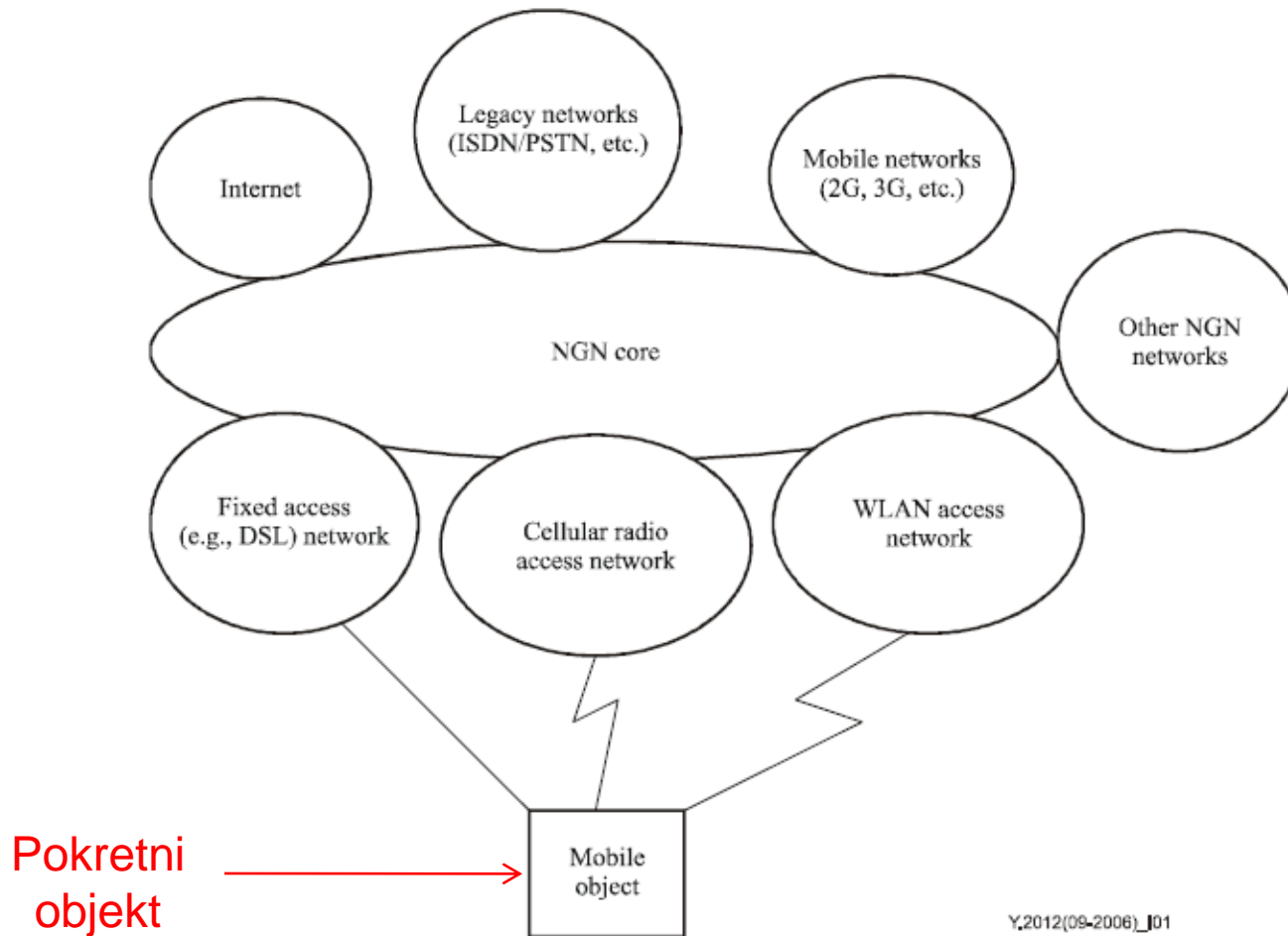


Figure I.1 – NGN core and access networks

# Primjer 3: pokretljivost (1)

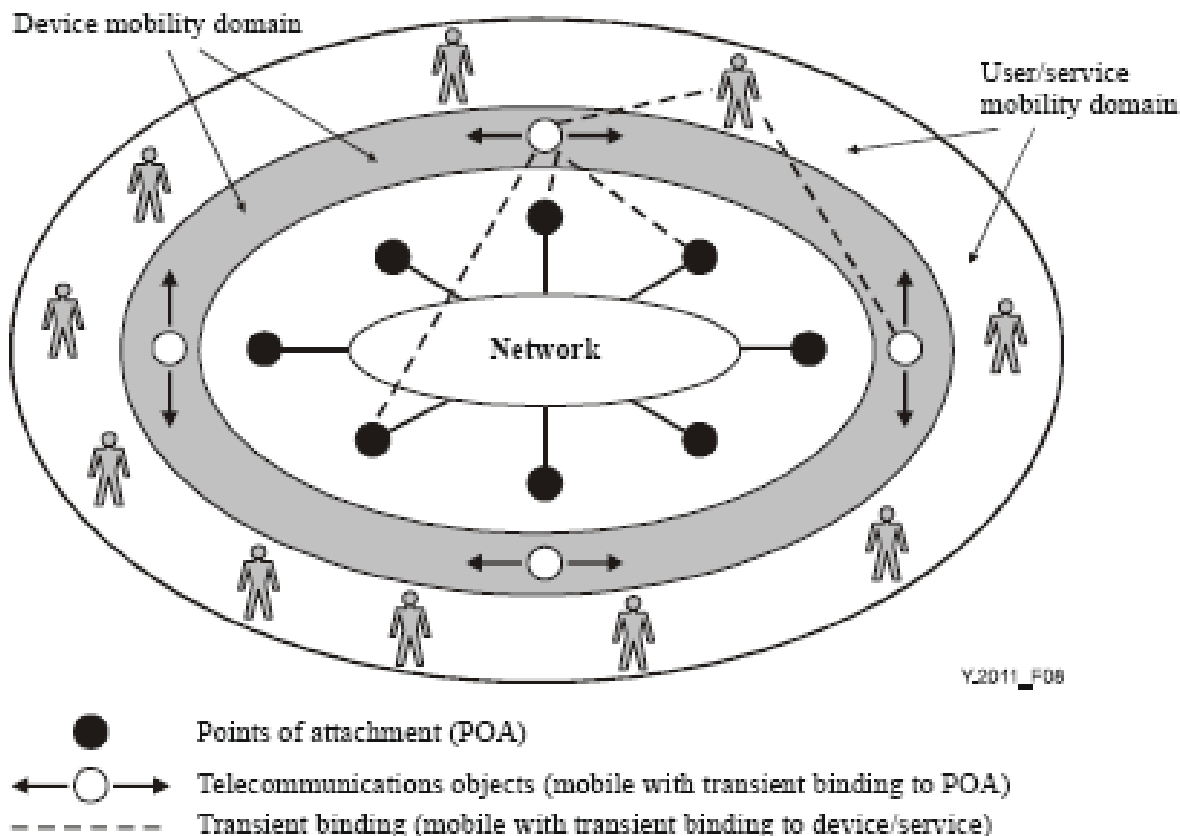


Figure 8/Y.2011 – Relationship of users, devices and locations

# Primjer 3: pokretljivost (2)

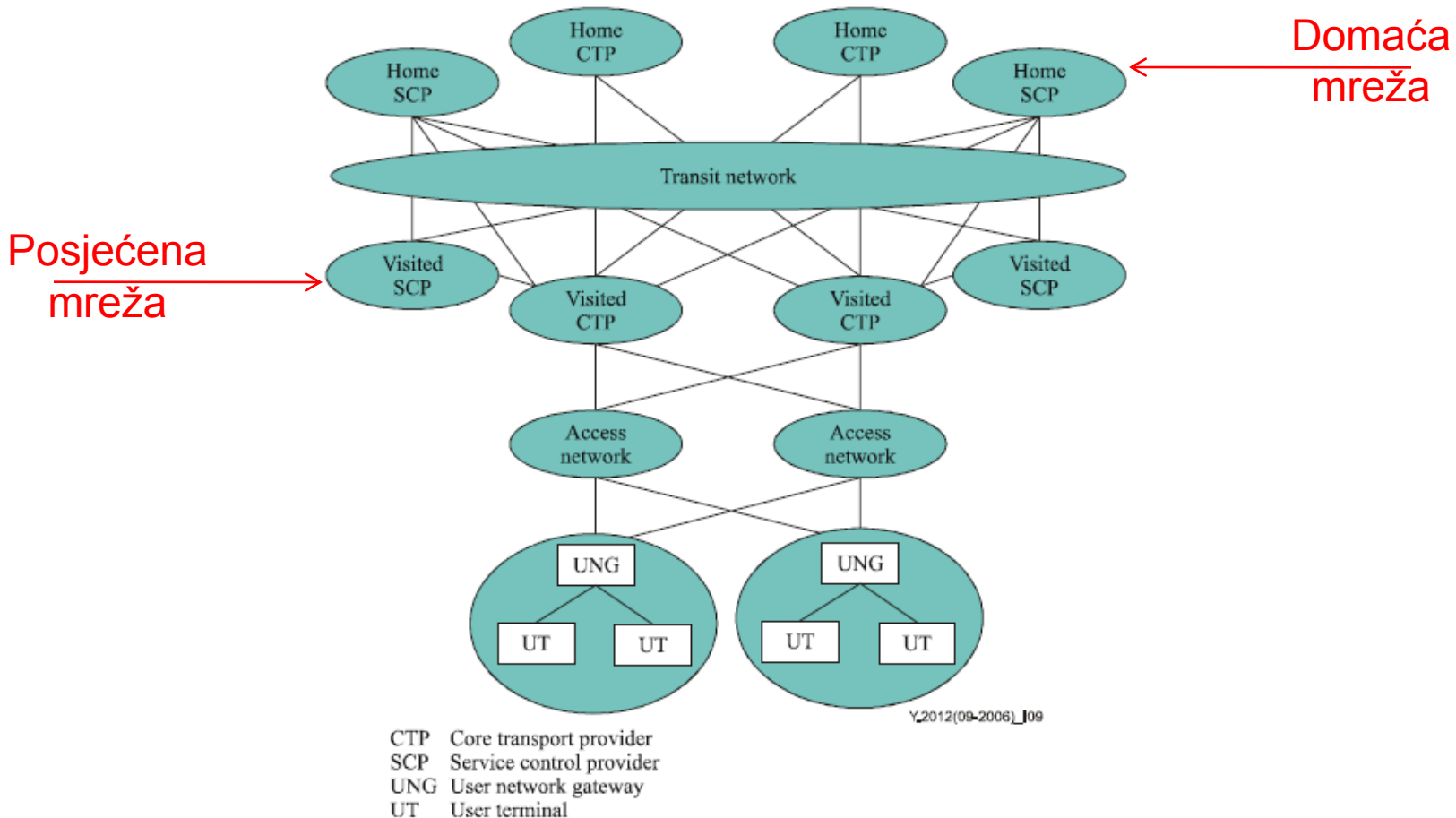


Figure I.9 – Home and visited network functional roles

# LTE

# Long Term Evolution (LTE)

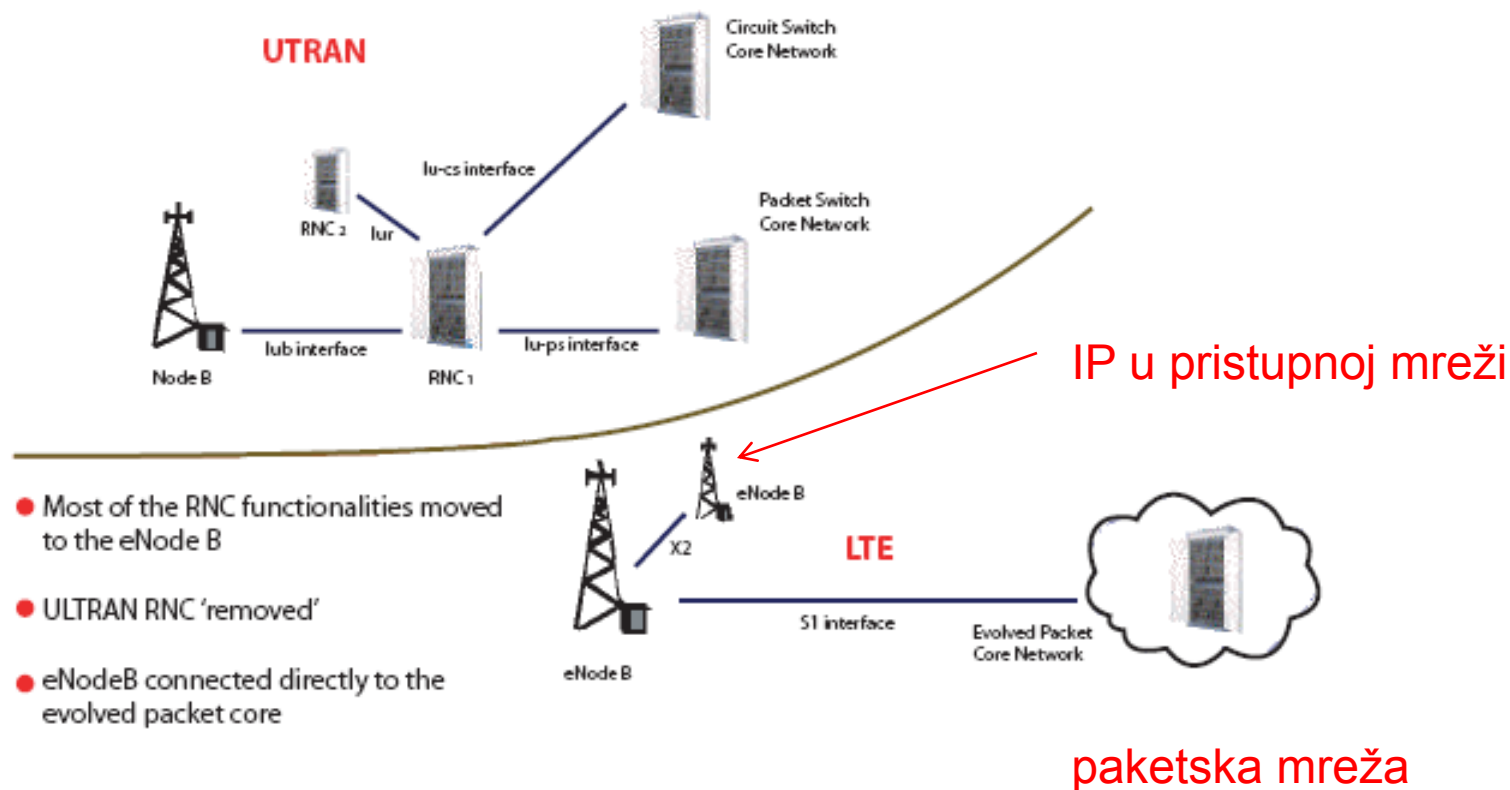


Figure 13: LTE simplified architecture

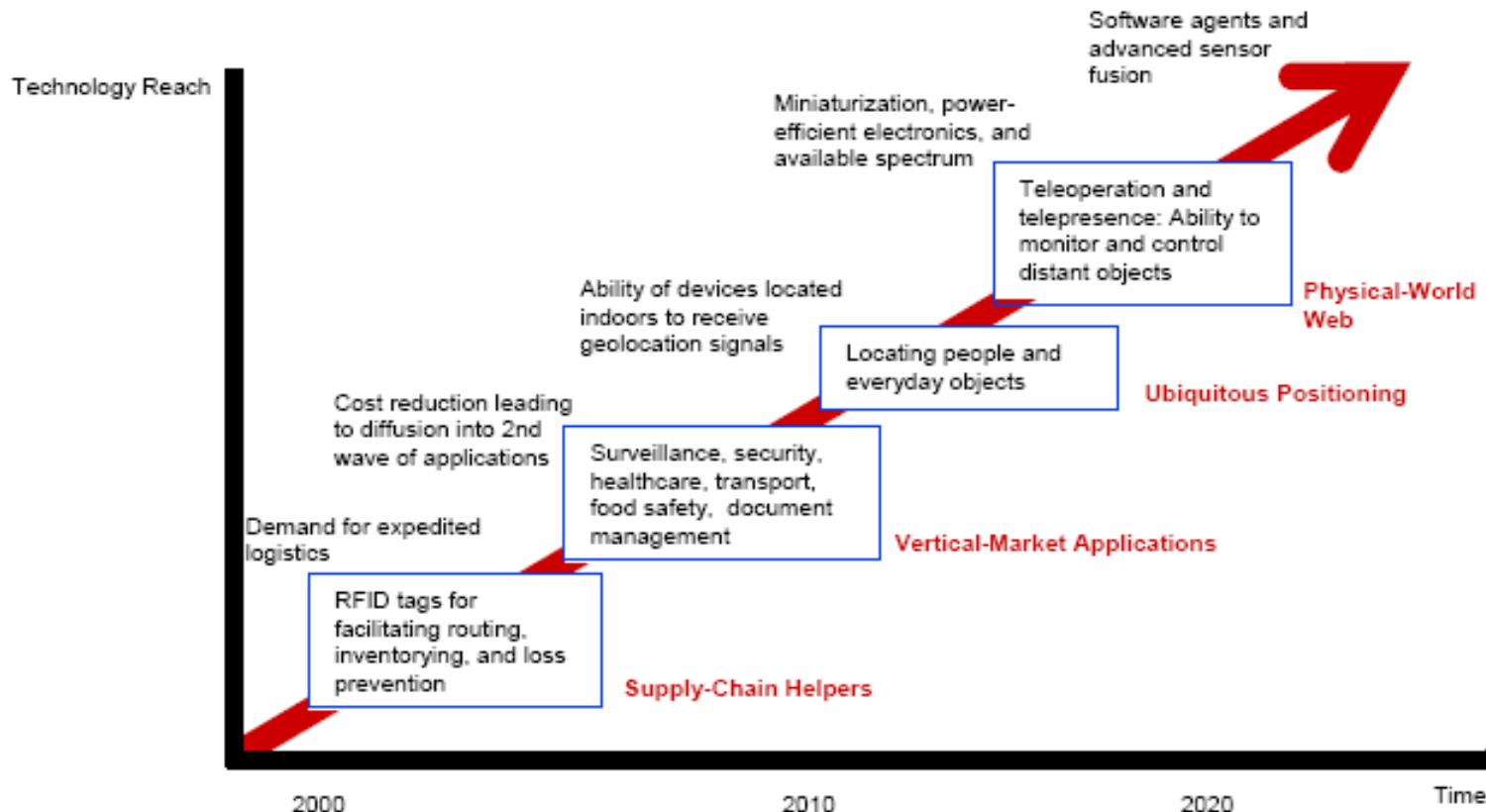
Source: 3GPP

Izvor: Mobile Broadband Evolution: the roadmap from HSPA to LTE,  
UMTS Forum, 2009.

FI

- Services and networking architecture for the Future Internet.
- Location independent, interoperable, coherent, consistent, scalable, pervasive, reliable, secure and efficient access to a coordinated set of services.
- Tools supporting collaborative business models and social network applications.
- Technologies ensuring the robustness and security of the networks, managing identities, protecting privacy and creating trust in the on-line world.
- Approaches and tools to leverage the full potential of the Internet of Things.
- Capabilities for supporting the creation, sharing, locating and delivery of new-media content.

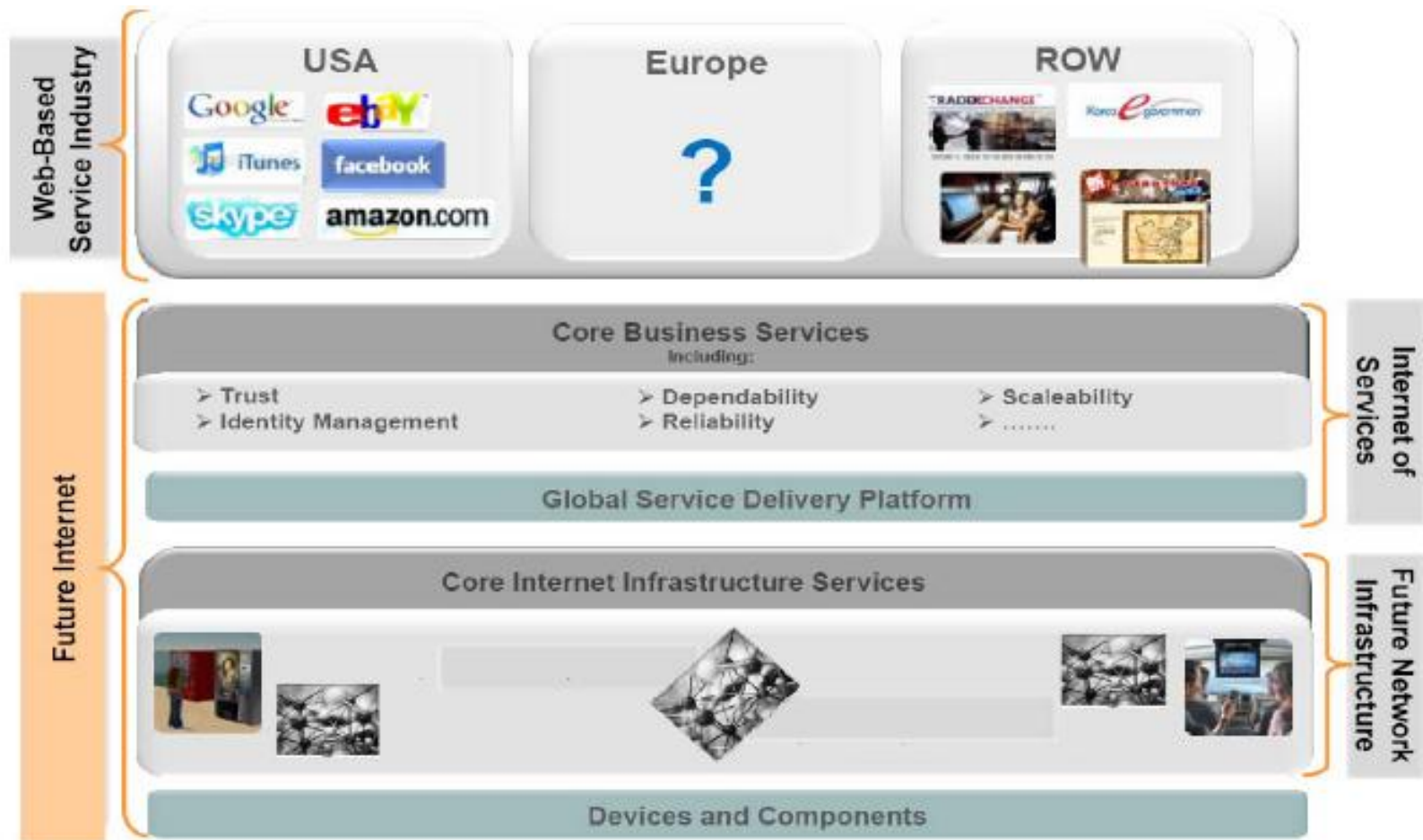
Izvor: The Future Internet Manifesto,  
The Bled Declaration: Towards a European Approach to Future Internet, 2008



Source: SRI Consulting Business Intelligence

Izvor: Disruptive Technologies 2025,  
SRI Consulting Business Services, 2008

# Internet of Services (1)



Izvor: Future Internet Roadmap, Deliverable 1.1. – Service Web 3.0, Public Roadmap, 7FP, 2009 ([www.serviceweb30.eu](http://www.serviceweb30.eu))

*Service Oriented Architecture (SOA)*

*Software as a Service (SaaS)*

*Media as a Service (MaaS)*

*Cloud Computing*

*Service Web 3.0*

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# Kontekstno svjesne usluge

## Kontekstna ovisnost: uzima se u obzir kontekst

### ◆ Ljudski čimbenici:

- Korisnik: osobnost, mentalno stanje, ..
- Društveno okruženje: bliskost s drugim ljudima društveni odnosi, suradnja, ...

### ◆ Okoliš:

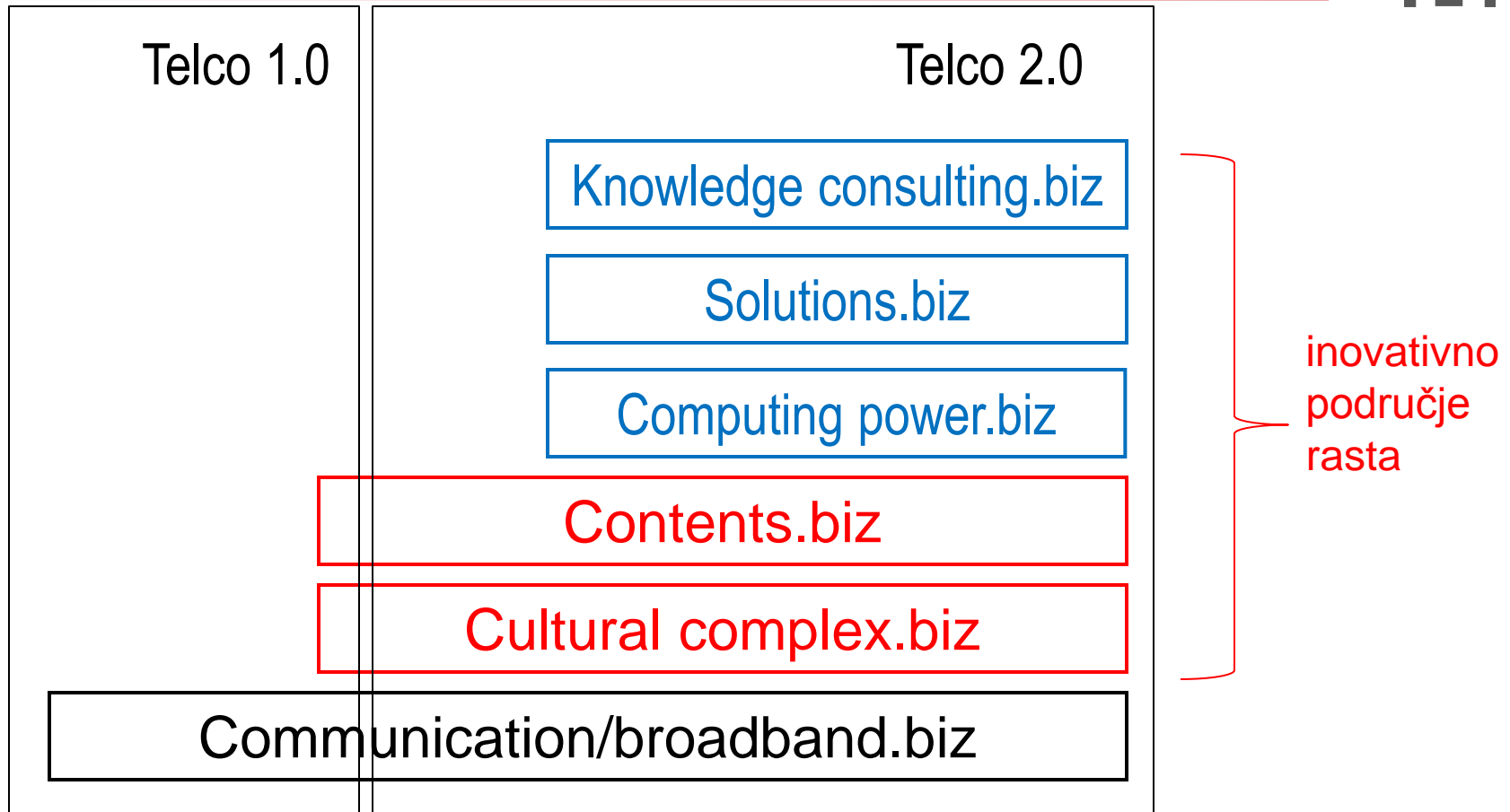
- Lokacija: apsolutna, relativna
- Infrastruktura: komunikacijska, računalna, ...
- Uvjeti: buka, vidljivost, svjetlost, ...

## *Rich Presence Information Data*

- `activities` – što osoba trenutno radi (odsutan, na ručku, ...)
- `class` – skupina sličnih
- `deviceID` – oprema s kojom se ostvaruje usluga
- `mood` – raspoloženje osobe (umoran, ljut, ...)
- `place-is` – obilježja mjesta (tamno, bučno, ...)
- `place-type` – vrsta mjesta (stan, ulica, ...)
- `privacy` – način komuniciranja (audio, poruka, ...)
- `relationship` – društveni odnos (kolega, prijatelj, ...)
- `sphere` – okružje (radno mjesto, sportski teren, ...)
- .....

Izvor: RPID: Rich Presence Extensions to the Presence Information Data Format (PIDF), RFC 4480, 2006

# Telco 2.0



Izvor: Jong-Lok Yoon, "Telco 2.0: A New Role and Business Model"  
IEEE Communications Magazine., Vol. 45., No. 1, 2007