Sead Kurtović, dipl. ing. saob. i kom.

**Pokretačke snage promjena**

**u pristupnim mrežama**

***Driving forces of changes in access networks***

**Sažetak**

Pokretačke snage promjena u telekomunikacijskim pristupnim mrežama, kao

infrastrukturnim elementom, proizlaze iz specifičnih zahtjeva prometnih karakteristika

različitih tipova usluga u telekomunikacijskom sistemu. Glavni pokretači

utjecaja na infrastrukturu jesu trošak i promjene kroz tehnološki napredak,

zahtjev krajnjeg korisnika za pristup s bilo koje lokacije, olakšanje neograničenog

pozivanja i posebno osobna sigurnost. Osim toga, utjecaji na infrastrukturu

će dolaziti od povećanja konkurencije između infrastruktura, kao što su

celularna mobilna, nova generacija mobilnih mreža, ISP masovni prijenos, kablovska

TV. Podrška novoj telekomunikacijskoj infrastrukturi jesu i standardi

koji dolaze od internetske zajednice i tijela kompjuterske industrije, kao što je

udruženje IEEE.

**Ključne riječi:** pokretačke snage, infrastruktura, pristupne mreže, usluge, trošak,

tehnološki napredak, korisnik

**Abstract**

Driving forces of change in telecommunications access networks, as an infrastructural

element, arising from the specific requirements of the various types

of transport services in the telecommunications system. The main drivers of the

impact on infrastructure and the cost of change through technological advances,

end-user demand for access from anywhere, facilitating unlimited calling

and a special personal safety. In addition, impacts on infrastructure will come

from increased competition between infrastructures, such as cellular mobile,

new generation of mobile networks, Internet ISP mass transfer, cable TV. Support

for new telecommunications infrastructure and standards are coming from

the Internet community and the computer industry, such as the society IEEE.

**Key words:** driving forses, infrasture, access network, services, cost, technology

progress, user

mr. Osman Džindo, dipl. ing. el.

dr. Himzo Bajrić, dipl. ing. el.

**Saobraćajni inžinjering u MPLS mrežama**

***MPLS traffic engineering***

**Sažetak**

Današnje mreže, posebno one koje pripadaju Internet Service providerima i

velikim korporacijama, karakteriziraju veliki promet i različite vrste informacija

koje se prenose mrežom. Velika gustoća prometa posebno je izražena pojavom

integracije usluga, gdje se kroz mrežu prenose sadržaji generirani na

različitim uređajima (mobiteli, računari, A/V sistemi i dr.) i gdje se zahtijeva

prijenos informacija u realnom vremenu (A/V konferencije, video na zahtjev,

*triple play* usluge i sl.)

Problem skalabilnosti izražen je u velikoj mjeri, jer se mreža na ATM-u mora

preslikati na IP sloj. S obzirom na to da se današnje mreže predstavljaju tzv.

*overlay* modelom, gdje imamo IP nad ATM-om, veze među usmjerivačima

ostvarene su *full mesh* topologijom, što direktno utječe na skalabilnost, a dalje

je indirektno povezano s problemima pojave kvara u mreži te s uspostavom

stacionarnog stanja u mreži nakon kvara.

Navedeni problemi mogu se riješiti pomoću metoda saobraćajnog inžinjeringa

(Traffic Engineering, TE) i mrežnog inžinjeringa (Network Engineering, NE),

a kao alat za rješavanje ovih problema koristi se MPLS (Multiprotocol Label

Switching). Cilj rada je pokazati primjenu MPLS-a u rješavanju problema saobraćajnog

inžinjeringa.

Korištenjem mrežnog simulatora NS-2 izvršena je simulacija ponašanja mreže

kada se koristi konvencionalni metod usmjeravanja i kada se koristi u mreži

MPLS saobraćajni inžinjering. Rezultati pokazuju da korištenjem MPLS-a povećavamo

iskoristivost mrežnih linkova u odnosu na klasične metode usmjeravanja,

jer se ne stvaraju zagušenja u mreži koja su karakteristična pojava

konvencionalnih protokola koji danas egzistiraju u mreži.

**Ključne riječi**: MPLS, mrežni inžinjering, NS-2, saobraćajni inžinjering

**Abstract**

Communications networks today, especially the ones of the Internet Service

Providers and large corporations are characterized by quantity and variety of

the data traffic, as well as, different kinds of information that are transmitted by

the network. Big traffic density is usually caused by an integration of different

services through different devices (cell phones, computers, audio-video devices

etc.) that require real time transfers (audio- video conferences, video on

demand, triple play services etc.).

Problem of scalability is greatly present because the network on ATM layers

has to be mapped onto IP layer. Taking into consideration that today’s networks

are mainly overlay modeled where we have IP over ATM, connections

between routers are estasblished by full mesh topology that directly influences

scalability and furthermore has direct link with the network failures and network

recovery.

Above mentioned problems can be solved using method of traffic engineering

(TE) and network engineering (NE), using MPLS as a tool for solving these

problems. The purpose of this study is to show how we can use MPLS to solve

the problem of traffic engineering.

By using network simulator NS-2, network is simulated through conventional

method of routing and when MPLS traffic engineering is used. The results

show that using MPLS increases utilization of network links in contrast to classical

methods of routing because there are no bottlenecks which are common

characteristic of conventional protocols that are currently used in today’s

networks.

**Keywords:** MPLS, Network Enginnering, NS-2 Traffic Engineering

mr. Selma Kovačević, dipl. ing. el.

**Pregled tema koje određuju primjenu**

**Cloud Computinga u telekomunikacijama**

***Summary of Cloud Computing topics in***

***telecommunications***

**Sažetak**

Telekomunikacijske kompanije mogu odigrati ključnu ulogu u razvoju i primjeni

Cloud Computing tehnologija, kombinirajući poziciju na tržištu koju kao mrežni

operatori imaju s novim talasom tehnoloških inovacija. Imajući u vidu činjenicu

da već sada zaostaju za vodećim IT vendorima, morat će napraviti značajne

iskorake u ovom pravcu.

Mogućnosti koje Cloud kao koncept donosi mogu značajno uvećati vrijednost

prenosnih mreža i stvoriti nove usluge i prihode za telekom operatore. Minimalno,

Cloud će značajno povećati obim i frekvenciju mrežnog saobraćaja u

postojećim mrežama i time dovesti do direktnog povećanja prihoda. Pružanje

Cloud-baziranih servisa omogućit će, također, razdvajanje prihoda na dva segmenta:

obračun i naplatu troškova za pruženi nivo usluge te obračun i naplatu

troškova prema nivou kvaliteta isporučene usluge. Telekom operatori mogu na

još bolji način iskoristiti Cloud Computing. Postojeća IP infrastruktura može

poslužiti kao dobra osnova za pružanje servisa, dok se nove tehnologije u

razvoju poput IP multimedija sistema i NGN mreže mogu s vremenom uklopiti

u Cloud okruženje.

**Ključne riječi:** Cloud Computing, Cloud provider, telekom operator, softver

kao servis, platforma kao servis, infrastruktura kao servis, set resursa, skalabilnost,

virtualizacija, širokopojasne mreže, virtualni podatkovni centri.

**Abstract**

Telecommunications providers could play an important and lucrative role in the

burgeoning world of Cloud Computing by combining their natural advantages

as network operators with a new wave of technological innovation.

The opportunity represented by Cloud-based services increases the value of

carrier networks in multiple ways and creates new roles (and revenues) for

telecom service providers. At minimum, Clouds will greatly increase network

traffic and utilization and thus transport revenues. Telecom carriers have an

opportunity to extract two revenue streams from the same function, charging

end users for a given level of service quality and, at the other end, charging

Cloud-based providers for service quality.

However, telcos could do much more than that thanks to some inherent advantages.

Their IP infrastructure could lend itself well to Cloud services, at least

compared to enterprise infrastructure, while emerging telco technologies such

as IP multimedia subsystems (IMS) and next-generation networks (NGN) service

architectures are developing into logical service components that could

also fit comfortably in Cloud environments.

**Key words**: Cloud Computing, Cloud provider, telecom provider, Software as

a Service, Platform as a Service, Infrastructure as a Service, resource pool,

scalability, virtualization, broadband networks, virtual data centers.

Ivan Radoš

***Structural reliability of model of NGN***

***network***

**Abstract**

A research of this article is focused on physical structural reliability of two part

of NGN network, a access network, and a core network and their network

components.

**Keywords:** Structural reliability, core network, access network, model, circuit

switching, packet switching

**Sažetak**

Istraživanje u ovom radu je usmjereno na fizikalnu strukturu pouzdanosti dva

dijela mreže buduće generacije, pristupne mreže i jezgrene mreže i njihovih

komponenti.

mr. Haris Hamidović, dipl. ing. el.

**IKT spremnost za upravljanje**

**kontinuitetom poslovanja**

***ICT Readiness for business continuity***

**Sažetak**

Elementarne nepogode, djela terorizma, tehnološke nesreće i ekološki incidenti

jasno su pokazali da ni javni ni privatni sektor nisu imuni od kriza, izazvanih

namjerno ili nenamjerno. Ovo je dovelo do stvaranja globalne svijesti o

tome da organizacije u javnom i privatnom sektoru moraju znati kako se pripremiti

za, i odgovoriti na, neočekivane i potencijalno razorne incidente. Efikasno

upravljanje kontinuitetom poslovanja često ovisi o djelotvornoj IKT pripravnosti,

kako bi se osiguralo da će se ciljevi organizacije ostvarivati i za vrijeme

poremećaja. U ovom radu predstavljamo značaj IKT spremnosti za upravljanje

kontinuitetom poslovanja.

**Ključne riječi:** upravljanje kontinuitetom poslovanja, BCM, IKT spremnost

**Abstarct**

Natural disasters, acts of terror, technology-related accidents and environmental

incidents have clearly demonstrated that neither public nor private sectors

are immune from crises, either intentionally or unintentionally provoked. This

has led to a global awareness that organizations in the public and private sectors

must know how to prepare for and respond to unexpected and potentially

devastating incidents. Effective business continuity management often depends

on effective ICT preparedness to ensure that the goals of the organization

will be realized during the time of disturbances. In this paper we present the

importance of ICT readiness for business continuity management.

**Key words:** Business Continuity Management, BCM, ICT readinesst

mr. Elmir Huremović, dipl. ing. el.

**Digitalna kinematografija**

***Digital cinematography***

**Sažetak**

Prelazak na digitalnu tehnologiju, za medijsku industriju i konzumente medija

je od velike važnosti. Pojedini analogni formati u potpunosti su došli u sjenu

svojih digitalnih suparnika. U radu su objašnjene osnove televizijskog signala

u analognom i digitalnom obliku i razlike između skeniranja slike CCD senzorom

karakterističnim za HDTV i skeniranja CMOS senzorom, koji je prisutniji u

digitalnoj kinematografiji.

Opisani su i industrijski standardi u vezi s filmskom trakom i formatima snimanja

i skeniranja slike. HDTV (High Definition Television) ili televizija visoke definicije

već je industrijski standard u svijetu. Televizije emitiraju program u ovom

formatu već dugo i područje emitiranja HDTV-a je prilično uređeno.

Posebna pažnja posvećena je novim digitalnim kamerama namijenjenim isključivo

za proizvodnju filmskog programa. Razvoj novih tehnologija učinio je

mogućim nešto doskora nezamislivo: digitalne videokamere postale su standard

u filmskoj industriji. Dok još iz tržišnog ugla tako ne izgleda, s tehničke

strane, kraj celuloidne filmske trake je izvjestan i neizbježan.

**Ključne riječi:**

CMOS (komplementarni metaloksidni poluprovodnik), HDTV (televizija visoke

definicije), MPEG (grupa eksperata za pokretne slike), FILM, RED ONE, CANON,

ARRI, CCD (*uređaj za prijenos električnog naboja)*, SENZOR, Zatvarač,

CF (*kompaktna Flash*) memorija, H264, DSLR (*digitalno jednostruko reflektirajuće*

*sočivo*).

**Abstract**

The transition to digital technology is of great importance, for the media industry

and consumers itselves. Some analog formats are fully came into the shadow

of their digital rivals. The paper explains the basics of television signals

in analog and digital form and the differences between image scannig with

CCD sensor for the HDTV and a distinctive scanning of CMOS sensor that is

present in digital cinematography.

Industrial standards for film and tape recording formats have been described.

HDTV (High Definition Television) is already an industrial standard in world today.

World’s TV stations have been broadcasting in this format for several years

now and the area of HDTV broadcast is well regulated. A special attention

was paid to the newest digital HD cameras used exclusively for film production.

Development of new technologies made it possible to something that was unthinkable:

digital video cameras have become standard in the film industry.

From the market perspective it does not seem so, the end of the celluloid film

tape is certain and inevitable.

**Key words:**

CMOS (*Complementary metal–oxide–semiconductor*), HDTV (High-definition

television), MPEG (*Moving Picture Experts Group*), FILM, RED ONE, CANON,

ARRI, CCD (*charge*–*coupled device*), SENSOR, SHUTTER, CF (*Compact*

*Flash*) Memory, H264, DSLR (*Digital Single Lens Reflection*).