Economic Benefits of Automated Vehicle System

NN

October 13, 2016

Seminar: Internet Economics, Talk No. 1

Automated Vehicle Systems (AVSs) are an important research topic in a strategic solution to the mobility problems that may arise in the coming years [5]. The integration of intelligent and automated features and autonomous functionalities in vehicles will lead to major economic benefits, including reduced fuel consumption [1], [2]. Cost-benefit analyses are still the dominant method for evaluating AVSs and other transport engineering projects [3], however, the human factor in AVSs is also analized in order to fulfill the automated demands [4].

This economic benefits study of AFS shall be provided in the report. An overview of available AVSs technology and what their advantages and drawbacks are. Furthermore, the report will show the current state of development in AVSs and the limitations of AVSs. Finally, the report will indicate some issues that need to be solved in order to apply AVSs

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Further reading and search for additional literature is required and recommended strongly!

Economics of Radio Towers

NN

October 20, 2016

Seminar: Internet Economics, Talk No. 2

Mobile networks are an integral part of our private and professional lives. The data delivered over moble networks grows continously and requires constant updating of those networks. The Swiss National Council (Nationalrat) has motioned the Federal Council (Bundesrat) in March 2016 to investigate how regulations on cell tower radiation can be relaxed. An increase of the cell tower radiation levels is controversial as there is little to none scientific proof of longterm effects of such radiation [5][6].

The supporters argue that the Swiss mobile networks are reaching their limit and that increasing the radiation levels is the best way to improve the networks while it is not harmful to humans [4]. The oponents claim that cell radiation has negative effects on humans and animals and that the problem can also be solved by deploying more antennas [4].

This seminar topic focuses on the cost and benefits of operating more cell towers vs. increasing the raditaion levels of existing towers. The report shall explain the basics of mobile network design and deployment and discuss the associated cost [1] [3]. The report shall also give an overview of the currently avialble research related to effects of cell radiation on the human body [2].

References

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Further reading and search for additional literature is required and recommended strongly!

Techniques and Strategies for Improving Network Energy Efficiency

NN

October 27, 2016

Seminar: Internet Economics, Talk No. 3

An explosion of computing devices, stationary and portable, is currently underway. These computing devices include, but are not limited to, smartphones, laptops, tablets, phablets, etc. Demand for these devices is made more acute by social media's rapid evolution, which encourages a need to communicate and be in contact with others. Social applications, which are consumed by the users today, together with other applications and capabilities required by businesses, have grown so much that the amount of power and computing for supporting these applications require dedicated data centers [1].

However, each data center is in itself a large amalgam of physical devices, e.g., computing devices, servers, routers, etc. and virtual devices, e.g., virtual machine, virtual router, virtual switch, etc. Each of these devices consumes real electric power, which given the large size of the data center, is becoming a considerable expense associated with the data center. In this regard, although there is no consensus in the literature with respect to how much electricity the network part consumes in a data center, the available studies indicate numbers that vary between 4% and 22% of the total data center's consumption [2].

In this regard, several functionalities and protocols have been proposed to cope with energy efficiency in networks, ranging from the design of new energy efficient silicon technology to energy aware routing protocols and applications. In this seminar the student shall select one capability in one of the approaches [3,4,5], and describe in details its functioning, characteristics and advantageous conditions of use. Furthermore, the student is encouraged to propose enhancements on the selected capability.

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[1] Roy et al. "Inside the Social Network's (Datacenter) Network". http://cseweb.ucsd.edu/~snoeren/papers/fb-sigcomm15.pdf

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Further reading and search for additional literature is required and recommended strongly!

Comparing Blockchains

NN

November 3, 2016

Seminar: Internet Economics, Talk No. 4

In recent years, electronic contracts have gained a lot of attention, especially in the context of the blockchain technology. While public blockchains are considered secure, legally binding under certain circumstances, and without any centralized control, they are applicable to a wide range of application domains, such as smart contracts, public registries, registry of deeds, or virtual organizations. As one of the most prominent blockchain example, the Bitcoin[1] system has reached large public, financial industry-related, and research interest. Another prominent blockchain example, Ethereum[2], which is considered a general approach for smart contracts has taken off too. Nevertheless, various different set of functions, applications, and stakeholders are involved in this smart contract arena, which by itself sees a wider range of advantages, problems, and development chances.

The goal of this seminar report is to find and list other blockchains besides Ethereum and Bitcoin and outline its main features. The list of blockchains is growing and most of the information about those blockchains is either online or in discussion boards. Thus, the challenge will be to find reliable information about those blockchains. Candidate blockchains besides Ethereum and Bitcoin (and few altcoins such as Litecoin) are: Lisk, R3 Corda, IOTA, Eris:DB, Chain Core, Hyper Ledger, Nxt, Stratis, Multichain, BigchainDB, Ripple/Steller, RSK, Openchain, Counterparty, Blockstream. Other relevant blockchains not listed should be added to this list.

References

[1] Satoshi Nakamoto, Bitcoin: A Peer-to-peer Electronic Cash System, http://bitcoin.org/bitcoin.pdf

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Further reading and search for additional literature is required and recommended strongly!

Emerging Pricing Models for Cloud Services

NN

November 10, 2016

Seminar: Internet Economics, Talk No. 5

Cloud computing allows for large scale sharing of computing resources in a technically and administratively scalable manner. It is, therefore, quickly adopted by a large number of companies (not limited to the IT sector) also resulting in a high end-user adoption [1]. This seminar topic, therefore, focuses on an important aspect of commercial clouds: pricing schemes.

In particular, it shall be investigated how different major and minor cloud providers price their cloud services. The most important cloud providers to be looked at are Amazon [2], Google [3], and Microsoft [4]. It shall be compared, which service models, e.g. Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), are offered and how they are priced. Most importantly, it shall be investigated, whether flatrate charging schemes or other non-volume based charging models are offered, i.e., where the user does not pay on a per VM basis. If this is the case, these charging models shall be discussed and compared in detail.

The report shall conclude on which cloud provider is most affordable, potentially also taking into account factors of varying performance [5].

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[1] L. Schubert and K. Jeffery. Advances in Clouds. European Commission, Publications Office of the European Union, Luxembourg, 2012.

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Further reading and search for additional literature is required and recommended strongly!

Social and Economical Impact of New Swiss Law on Observation of Post and Telecommunication Traffic

NN

November 17, 2016

Seminar: Internet Economics, Talk No. 6

In March 2016 the Swiss parliament has decided a new law regarding the observation of post and telecommunication traffic: "Bundesgesetz betreffend die Überwachung des Post- und Fernmeldeverkehrs (BÜPF)" [1]. The law was subject to heated debate and criticism from oponents who initiated an unsuccessful referendum.

This new law affects citizens, telecommunication providers, and communication services providers, e.g., messenger services. All these stakeholders are obliged to help the Federal Post and Telecommunications Observation Service [3] by providing Data of their users if requested. According, to [4] the impact of the new law on the telecommunications sector in general is low. However, for small to medium businesses (SMB) the individual impact is possibly high. Authorities believe that this legislature brings improvements in law enforcement, which is highly doubted by the referendum comittee [2]. Furthermore, a study [5] suggests that the reduction of observation activities in Germany did not lead to a decrease in successrate of criminal investigations compared to Switzerland where no reduction was made.

This seminar report will explain the changes made from the old to the new legislature [1]. Based on these differences an analysis of the economical impact of the new law shall be made, with a focus on the impact on SMBs. Furthermore, an evaluation of the benefits of the new law in law enforcement and criminal investigations shall be presented. As many resources are only available in German (some also in French or Italian) students working on this topic should be fluent in German, French, or Italian.

References

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Further reading and search for additional literature is required and recommended strongly!

The Breaching of Cloud SLAs: Why it Happens and How to Prove it

NN

November 24, 2016

Seminar: Internet Economics, Talk No. 7

Cloud Computing (CC) is a computing paradigm enabled by the growing connectivity provided by modern communication systems combined with virtualization technology [1]. CC allows customers, such as companies and end-users, to rent computational resources from data centers for many different purposes [2]. Because customers share the rented computational resources (clouds apply statistical multiplexing to increase efficiency and reduce costs [3, 4]) and are connected to them via the Internet, the Quality of Service (QoS) may not be as high as desired by the customer. Because resources are rented, i.e., money is transfered, Service Level Agreements (SLAs) will prescribe the performance the cloud provider has to deliver [5]. However, when the customer feels the contracted QoS is not achieved, this may not be cloud providers fault. In particular, when the customer runs delays sensitive applications the cause of a low QoS may also be the network [6] connecting the customer to the cloud. Therefore, QoS monitoring of the network [7] and the cloud is necessary to certify that the cloud provider achieves the contracted QoS.

This report shall compile and explain cloud monitoring methods. It shall be focused on how the variable of network performance is accounted for and conclude on whether the cloud or the network usually is the cause for perceived low cloud QoS.

References

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Further reading and search for additional literature is required and recommended strongly!

Microtransactions with the Lightning Network

NN

December 1, 2016

Seminar: Internet Economics, Talk No. 8

Bitcoin [1] is an open and fully distributed P2P digital currency that is gaining more and more popularity. Bitcoin is independent of any centralized authority and the current market capitalization is 9.2 billion USD [2]. This market capitalization reflects the amount created Bitcoins with the current exchange rate. Transactions can be initiated by any peer and can be transferred to any valid Bitcoin address. The creation of Bitcoins is done by securing transaction by Bitcoin miners. Securing means to solve a crypto puzzle that is difficult to compute. Real money can be exchanged to Bitcoins via centralized exchange sites. Every Bitcoin transactions requires fees to pay for a timely inclusion in the blockchain, which is around 10 - 30 cents. This makes microtransaction unfeasible.

The goal of this seminar report is to describe the idea and its design of the Lightning Network[3], which allows to create microtransactions. It allows instant payments without waiting for block confirmation times. The Lightning Network scales up to billions of transaction per seconds, which is an order of magnitude larger than the current 7 transactions per seconds in the Bitcoin network. The report shall include the details about the architecture and the security aspects.

References

[1] Satoshi Nakamoto, Bitcoin: A Peer-to-peer Electronic Cash System, http://bitcoin.org/bitcoin.pdf

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Further reading and search for additional literature is required and recommended strongly!

Economical Impacts of SDN and NFV for Telecom Operators

NN

December 8, 2016

Seminar: Internet Economics, Talk No. 9

Due the pervasive diffusion of broadband access, increasing performance of chipsets and IT hardware, and a widespread availability of open source software, Software-Defined Networking (SDN) and Network Functions Virtualization (NFV) are two main paradigms gaining attention towards the establishment of software-defined infrastructures. While SDN is fundamentally based on decoupling software from hardware, consolidating the control plane so that single software controls multiple data plane elements [1], NFV regards the virtualization of network functions and their dynamic allocation and execution on generic servers [2].

Aligned, SDN and NFV offer agile and programmable network infrastructures toward generic network hardware deployed on open software, in which functions of the centralized control can be performed through virtualized functions and capabilities from NFV [3]. Combined in the cloud infrastructure, SDN and NFV enable operators to extend management capabilities of the data center, increasing both agility and flexibility of the service provisioning whilst the overall OPEX and CAPEX efficiency are increased [4,5].

This seminar shall give a brief introduction into both paradigms, discussing the major challenges and benefits of combining SDN and NFV into a telecom cloud infrastructure scenario. Also, the student should describe through use cases, technical and economic benefits/drawbacks of software-based networking in relation to traditional networking, further describing ideal scenarios for their adoption. Furthermore, as networking will be more intimately related to compute resources, the student is encouraged to quantify/model the impact of SDN and NFV on data center resource consumption.

References

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Further reading and search for additional literature is required and recommended strongly!

Challenges in 5G: Social, Technology, and Economic Perspectives

NN

December 15, 2016

Seminar: Internet Economics, Talk No. 10

The fifth generation (5G) mobile communication is an emerging technology for future mobile communication. The investigations of 5G are conducted in many areas such as in technology, economic, and social perspectives. The technology perspective takes into account the complex context of operation and essential requirements [1], [2]. [3]. The economic perspective discusses from the research and innovation activities to infrastructure investments and prospects for early commercial developments [4], [5], [6]. The latest social perpective investigates the social acceptability in order to improve the user satisfaction [7], [8].

This seminar report shall provide a brief introduction to 5G and its challenges in prementioned perpectives. Based on the 5G investigations, each perspectives are discussed why and how they are feasible or hardly deployed.

References

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Further reading and search for additional literature is required and recommended strongly!

Comparison of IoT Business Models

NN

December 22, 2016

Seminar: Internet Economics, Talk No. 11

The challenge for the Internet of Things (IoT) stakeholders and the IoT ecosystem is to create value for individuals or business [7]. The value differs for different stakeholders; individuals can perceive value as something that is “improving” their life or bring them new experiences; businesses, preceive value by ROI (return of investment), that is transated in saving company money, directly, either by lowering costs, or indirectly, by improving efficiency of existing resources.

The involvement of many stakeholders in the IoT digital value chain can create rather complicated business models necessary for many IoT applications that in short term limit the impact of IoT technologies and applications [5,6]. IoT brings challenges to the stakeholders in the IoT ecosystem on identifying horizontal needs and opportunities, the management challenge related to internal organizational goals (i.e., matching technology and to the objectives of business developers), and the ways to overcome the market maturity issues for new IoT technologies.

The goal of this seminar topic is three-folded: First, explain the general business model definition presented by the “magic triangle” [1] shown in the figure right providing four dimensions - who, what, how, and value. Second, introduce the Canvas Model [2] to characterize the main key issues for a business model that support answering the categorize from the “magic triangle”. Based on this state how business models changed due to the IoT development compared to traditional settings. Third, compare available IoT Business Model frameworks with each other that are in place starting with [3, 4, 8].

References

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Further reading and search for additional literature is required and recommended strongly!