A multi-radio, multi-hop ad-hoc radio communication network for Communications-Based Train Control (CBTC)

Communications-Based Train Control (CBTC) is a modern signalling system that uses radio communication to transfer train control information between train and wayside. The trackside networks in these systems are mostly based on conventional infrastructure Wi-Fi (IEEE 802.11). It means a train has to continuously associate (i.e. perform handshake) with the trackside Wi-Fi Access Points (AP) as it moves, which incurs communication delays. Additionally, these APs are connected to the wayside infrastructure via optical fiber cables that incur considerable installation costs. Our earlier work presented a novel design in which trackside nodes function in ad-hoc Wi-Fi mode, which means no association has to be performed with them prior to transmitting. A node upon receiving packets from a train forwards these packets to the next node, forming a chain of nodes. Following this chain, packets arrive at the destination. To make the design resilient against interference and failures, transmissions are separated on multiple frequencies and a node forwards packets to not only one but two of its neighbors. This paper investigates the resiliency, redundancy and scalability performance of this design and presents the results both from a field experiment involving prototype hardware and an extensive simulation study.
A multi-radio, multi-hop ad-hoc radio communication network for Communications-Based Train Control (CBTC) with optimized frequency separation

Communications-Based Train Control (CBTC) is a modern signalling system that uses radio communication to transfer train control information between train and wayside. The trackside networks in these systems are mostly based on conventional infrastructure Wi-Fi (IEEE802.11). It means a train has to continuously associate (i.e. perform handshake) with the trackside Wi-Fi Access Points (AP) as it moves, which incurs communication delays. Additionally, these APs are connected to the wayside infrastructure via optical fiber cables that incur huge installation costs. Our earlier work presented a novel design in which trackside nodes function in ad-hoc Wi-Fi mode, which means no handshake has to be performed with them prior to transmitting. A node upon receiving packets from a train forwards these packets to the next node, forming a chain of nodes. Following this chain, packets reach the destination. To make the design resilient against interference between the nodes, transmissions are separated on multiple frequencies, ensuring a certain separation between the transmissions. Nonetheless, the results show that despite this separation, a significant amount of interference is experienced along the chain due to the interference range being greater than the frequency separation distance. This paper proposes an extension to the design in which additional frequencies are employed in an interleaving fashion to optimize the frequency separation distance and presents the results from an extensive simulation study.

A Novel Algorithm for Flow-Rule Placement in SDN Switches

The forwarding rules, used by the legacy and SDN network devices to perform routing/forwarding decisions, are generally stored in Ternary Content Addressable Memory (TCAM) modules, which offer constant look-up times, but have limited capacity, due to their high capital and operational costs, high power consumption and high silicon footprint. To counter this limitation, some commercial switches offer both, hardware and software flow table implementations, termed hybrid flow table architecture in this paper. The software-based tables are stored in non-TCAM memory modules, which offer higher capacity, but with slower lookup times. In addition, these memory modules are limited in terms of how many requests they can serve per time unit. Thus, exceeding this threshold will lead to packet loss in the network. This paper proposes a novel placement algorithm, which dynamically decides whether a new flow rule should be placed in a hardware (expensive) or a software (cheap) table. The placement decisions are based on a number of criteria with the goal to increase the utilization of the software-based table, without introducing performance degradation in the network in terms of significant delay and
packet loss. The performance of the placement algorithm was evaluated through experimental measurements in a
testbed, which comprises a hybrid SDN switch, a server performing traffic generation and a server hosting the SDN
controller. The results indicate that, by limiting the maximum allowed processing capacity of the software table, the
number of accommodated flows is significantly increased, while bounding any excessive delays and avoiding packet loss.

**General information**
- **State:** Published
- **Organisations:** Department of Photonics Engineering, Networks Technology and Service Platforms
- **Contributors:** Kentis, A. M., Pillimon, A., Soler, J., Berger, M. S., Ruepp, S. R.
- **Number of pages:** 9
- **Publication date:** 2018

**Host publication information**
- **Title of host publication:** Proceedings of the 4th IEEE International Conference on Network Softwarization
- **Publisher:** IEEE
- **ISBN (Print):** 978-1-5386-4633-5
- **Keywords:** SDN, Flow tables, TCAM, OpenFlow Pipelines
- **Electronic versions:**
  - 10.1109/NETSOFT.2018.8459979
  - Source: PublicationPreSubmission
  - Source-ID: 145164628
- **Research output:** Research - peer-review › Article in proceedings – Annual report year: 2018

**A Novel Multimedia Streaming System for Urban Rail Environments Using Wi-Fi Peer-to-Peer Technology**
The amount of streaming multimedia data delivered to mobile devices is growing at a high rate. Research shows that a
large number of daily commuters stream audio and video to their mobile devices during their travels. This makes urban rail
environments a suitable platform for delivering entertainment, information and advertisement multimedia using novel
delivery techniques. In order to do so, the system presented in this paper utilizes the unused bandwidth of a
Communications-Based Train Control link to transmit multimedia to urban trains. Once on the train, multimedia is
distributed to passenger devices using Wi-Fi Peer-to-Peer (P2P) technology. Such a multimedia distribution system can
be deployed incrementally, as it can function concurrently with Wi-Fi connections already available in a number of trains.
This paper presents the results obtained by emulating multimedia streaming in an urban rail use-case. Namely, it
evaluates the received streaming multimedia quality parameters when new users arrive or existing users are replaced
during the train stops.

**General information**
- **State:** Published
- **Organisations:** Department of Photonics Engineering, Networks Technology and Service Platforms
- **Contributors:** Poderys, J., Farooq, J., Soler, J.
- **Number of pages:** 6
- **Publication date:** 2018

**Host publication information**
- **Title of host publication:** Proceedings of 2018 IEEE 87th Vehicular Technology Conference
- **Publisher:** IEEE
- **ISBN (Print):** 9781538663554
- **Keywords:** CBTC, Train communication, Multimedia, Streaming, Peer-to-peer, Wi-Fi Direct
- **Electronic versions:**
  - PID1209868.pdf
  - 10.1109/VTCSpring.2018.8417799
  - Source: PublicationPreSubmission
  - Source-ID: 143859560
- **Research output:** Research - peer-review › Article in proceedings – Annual report year: 2018

**A Vision for the Next Generation Platform-as-a-Service**
In an increasingly interconnected world, new opportunities for telecom-based services are emerging. Innovative
applications profit from cloud versatility and scalability, but require a platform to combine the optimized 5G network fabric
with the advancements in the domain of cloud computing, Software Defined Networking (SDN) and Network Function
Virtualization (NFV). In this multi-domain context, we find that available service platforms are lagging, because they tend
to be tightly coupled to a constrained set of technologies. In practice, we need the flexibility to deploy different
microservices over a heterogeneous range of infrastructure types, aggregating various virtualization, orchestration and
control mechanisms. Moreover, the integration of the service requires collaboration among a wide mix of actors (e.g.
developers, operators, hardware/software vendors, infrastructure/service providers or vertical integrators). We propose a next-generation Platform-as-a-Service (NGPaaS), devised as a modular framework for the development and operation of network services, while targeting a high degree of both customization and automation. The presented architecture is built around a workflow-based orchestrator which coordinates custom-built tasks across a tailored group of specialized infrastructure or platforms. We also explain how NGPaaS enhances DevOps-principles, to achieve a more efficient integration process across the many isolated administrative domains in the modern telco landscape.

Caching at the Mobile Edge: a Practical Implementation

Thanks to recent advances in mobile networks, it is becoming increasingly popular to access heterogeneous content from mobile terminals. There are, however, unique challenges in mobile networks that affect the perceived quality of experience (QoE) at the user end. One such challenge is the higher latency that users typically experience in mobile networks compared to wired ones. Cloud-based radio access networks with content caches at the base stations are seen as a key contributor in reducing the latency required to access content and thus improve the QoE at the mobile user terminal. In this paper, a prototype implementation of a mobile edge cache system is presented. The proposal focuses on compliance with existing LTE deployment and content-location solutions. The prototype is designed to perform assessment tests and evaluation of caching solutions. Results are then shown for the QoE improvements for the mobile user obtained by caching content at the base stations. This is quantified with a comparison to non-cached content by means of ping tests (10–11% shorter times), a higher response rate for web traffic (1.73–3.6 times higher), and an improvement in the jitter (6% reduction).
Co-simulation Platform for Train-to-Ground communications

The project SAFE4RAIL (SAFE architecture for Robust distributed Application Integration in roLling stock) from the Shift2Rail Joint Undertaking will provide a cosimulation platform based on hardware/software co-simulation. The platform will be used for Train-to-Ground (T2G) test environments in the context of the validation of the new wireless Train Control Management System (TCMS) transmission over LTE technologies in order to evaluate performances with realistic services and under various railway traffic conditions.

Evaluating TCMS Train-to-Ground communication performances based on the LTE technology and discreet event simulations

This paper focuses on performance evaluation of the Train to Ground traffic exchanges used to ensure safety and monitoring train functionalities carried by the Train Control Management System (TCMS). In the framework of the European project Safe4Rail from the Shift2Rail program, we try to use LTE (Long Term Evolution) network as an alternative communication technology, instead of GSM-R (Global System for Mobile communications-Railway) because of some capacity and capability limits. First step, a pure simulation is used to evaluate the network load for a high-speed scenario, when the LTE network is shared between the train and different passengers. The simulation is based on the discrete-events network simulator Riverbed Modeler. Next, second step focuses on a co-simulation testbed, to evaluate performances with real traffic based on Hardware-In-The-Loop and OpenAirInterface modules. Preliminary simulation and co-simulation results show that LTE provides good performance for the TCMS traffic exchange in terms of packet delay and data integrity.
GEANT JRA1-T2-D7.3 Overview of SDN Pilots Description and Findings: Part B
This document reports on SDN technology pilots utilising an infrastructure deployed across the GÉANT backbone in parallel to the infrastructure carrying production traffic. Technology pilots aim to verify the functionality and stability of novel, integrated software and hardware modules in a holistic way in an out-of-the-lab environment, while at the same time assessing the operational readiness of the SDN solutions. This deliverable updates deliverable D7.1 Overview of SDN Pilots Description and Findings Part A, and should be read as a standalone overview of pilot findings for all SDN use cases.

Implementing Resource-aware Multicast Forwarding in Software Defined Networks
Using multicast data transmissions, data can be efficiently distributed to a high number of network users. However, in order to efficiently stream multimedia using multicast communication, multicast routing protocols must have knowledge of all network links and their available bandwidth. In Software Defined Networks (SDN), all this information is available in a centralized entity - SDN network. This work proposes to utilize the SDN paradigm to perform network-resources aware multicast data routing in the SDN controller. In a prototype implementation, multicast data is routed using a modified Edmonds-Karp algorithm, by taking into account network topology and links load information. This paper presents the algorithm, implementation details, and an analysis of the testing results.
Re-Factored Operational Support Systems for the Next Generation Platform-as-a-Service (NGPaaS)

Platform-As-A-Service (PaaS) systems offer customers a rich environment in which to build, deploy, and run applications. Today’s PaaS offerings are tailored mainly to the needs of web and mobile applications developers, and involve a fairly rigid stack of components and features. The vision of the H2020 5GPPP Phase 2 Next Generation Platform-as-a-Service (NGPaaS) project is to enable “build-to-order” customized PaaSes, tailored to the needs of a wide range of use cases with telco-grade 5G characteristics. This paper sets out the salient and innovative features of NGPaaS and explores the impacts on Operational Support Systems and Business Support Systems (OSS/BSS), moving from fixed centralized stacks to a much more flexible and modular distributed architecture.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms, BT, Ghent University, Nokia Bell Labs, Virtual Open Systems, OnApp Limited, Università degli Studi di Milano-Bicocca, Vertical M2M
Number of pages: 5
Publication date: 2018

Host publication information
Title of host publication: Proceedings of 2018 IEEE 1st 5G World Forum
Publisher: IEEE
ISBN (Print): 978-1-5386-4982-4
Keywords: 5G, PaaS, BSS, OSS, Cloud Native, Microservices
Electronic versions: 1570454086.pdf
Source: PublicationPreSubmission
Source-ID: 148894233
Research output: Research - peer-review – Article in proceedings – Annual report year: 2018

The Next Generation Platform as a Service Cloudifying Service Deployments in Telco-Operators Infrastructure

5G standard emerges at a particular time in technology history when cloud transforms deeply almost all industries and services: it becomes obvious that innovations have to be made cloud-native for being successful. 5G must become the ubiquitous fabric blending universal connectivity (to humans, robots, sensors…) with cloud versatility and scalability. For realizing this vision, another model than IaaS must be adopted, the Platform as a Service (PaaS), which should be built to support telco-grade requirements and combine all sort of third-party applications. These are the core objectives of the Next Generation Platform as a Service (NGPaaS) project, a H2020 5G PPP Phase 2 project. The paper presents the project fundamentals, its architectural proposal and most relevant features.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms, Nokia Bell Labs, Ghent University, Virtual Open Systems, OnApp Limited, University of Milan - Bicocca, Atos SE, British Telecom, Vertical M2M
Pages: 399-404
Publication date: 2018

Host publication information
Title of host publication: Proceedings of the 25th International Conference on Telecommunications (ICT 2018)
Publisher: IEEE
ISBN (Print): 9781538623213
Keywords: Telco, Microservices, 5G, PaaS, DevOps, Devfor-Operations, SDN, NFV, FPGA, vSwitch, IoT, Cloud native
Electronic versions: 1570426640_1_.pdf
DOIs: 10.1109/ICT.2018.8464838
Train-to-Ground communications of a Train Control and Monitoring Systems: A simulation platform modelling approach

Under the SAFE4RAIL project, we are developing a simulation platform based on a discrete-events network simulator. This platform models the Train-to-Ground (T2G) link in the framework of a system-level simulation of Train Control Management System (TCMS). The modelled T2G link is based on existing wireless technologies, e.g. Wi-Fi and LTE. Different T2G scenarios are defined in order to evaluate the performances of the Mobile Communication Gateway (managing train communications) and Quality of Services (QoS) offered to TCMS applications in the context of various environments (regular train lines, train stations, shunting zones, etc.) while varying the number of communicating trains, train's speed, radio channel characteristics (delay spread, channel attenuation, etc.). This paper focusses on the design and validation of the TCMS transmission over Wi-Fi/LTE via an approach based on simulation. This simulation platform aims to be also used to test actual TCMS equipment's, i.e. Mobile Communication Gateway and Ground Communication Gateway, connected to it through Hardware-In-the-Loop facilities of the chosen discrete-events network simulator.

VIM Adaptation Layer for CORD

Due to a large number of mostly stationary users inside a train and the availability of a radio connection to the outside world, urban rail environments serve as promising candidates for multimedia distribution systems deployment. This work proposes to offload the individual per-passenger cellular network connections by using the excessive Communications-Based Train Control (CBTC) radio link bandwidth to deliver multimedia streams to a train, where it is subsequently distributed to the passengers using peer-to-peer based data distribution. Connections among the train passengers are implemented using the Wi-Fi Direct connectivity and data exchange is coordinated by using the Peer-to-Peer Streaming Peer Protocol. This work presents the solution and evaluates it in the scope of urban rail deployment. Network emulation tests are used to analyze the factors impacting the number of concurrent users that can use the proposed system. This work also proposes future work lines that can be used to improve the system's design.
Effects of Port Congestion in the Gate Control List Scheduling of Time Sensitive Networks

Time Sensitive Networking (TSN) can provide deterministic traffic behavior over Ethernet networks, for time sensitive traffic, whilst also bound the delay/jitter. To do so, the IEEE TSN working group introduced a network-wide transmission port scheduling mechanism. The duration of this schedule is directly related with the delay; hence reducing it can be beneficial within the TSN paradigm. This paper investigates the effects of port congestion, in the duration of the network wide schedule. A congested port can make scheduling more complex, leading to longer network-wide schedules. To verify this, the same set of experiments was repeated, with and without considering port congestion during path allocation. The computed paths were given as input to an implementation of the shifting bottleneck heuristic algorithm. The shifting bottleneck heuristic, computed the network-wide gating schedule. The results show that with port congestion as a metric during path allocation the duration of the gating schedule in multipath networks can be reduced up to 26%.

Evaluating Application-Layer Traffic Optimization Cost Metrics for P2P Multimedia Streaming

To help users of P2P communication systems perform better-than-random selection of communication peers, Internet Engineering Task Force standardized the Application Layer Traffic Optimization (ALTO) protocol. The ALTO provided data-routing cost metric, can be used to rank peers in P2P communication systems. However, the method to derive the data-routing cost metric is undefined by the standard. This paper proposes and evaluates three methods to derive the data-routing cost metric for use in ALTO servers.
GEANT JRA1-T2-D7.1 -Overview of SDN Pilot Description and Findings
This document reports on SDN technology pilots utilising infrastructure deployed across the production GÉANT backbone in parallel to the infrastructure carrying production traffic. Technology pilots aim to verify the functionality and stability of novel, integrated software and hardware modules in a holistic way in an out-of-the-lab environment, while at the same time assessing the operational readiness of the SDN solutions.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms, Greek Research and Technology Network, University of the Basque Country, GÉANT, Poznan Supercomputing and Networking Center, The Internet Research Center, University of Murcia, CREATE-NET, GIP Renater, CNIT, Leibniz Supercomputing Centre, JANET
Number of pages: 51
Publication date: 2017

Performance evaluation of a multi-radio, multi-hop ad-hoc radio communication network for Communications-Based Train Control (CBTC)
Communications-Based Train Control (CBTC) is a modern signalling system that uses radio communication to transfer train control information between the train and the wayside. A vast majority of CBTC systems worldwide use IEEE 802.11 Wi-Fi as the radio technology mostly due to its cost-effectiveness. The trackside networks in these systems are mostly based on conventional infrastructure Wi-Fi. It means a train has to continuously associate (i.e. perform handshake) with the trackside Wi-Fi Access Points (AP) as it moves. This is a timeconsuming process associated with a certain delay. Additionally, these APs are connected to the wayside infrastructure via optical fiber cables that incurs huge costs. This paper presents a novel design in which trackside nodes function in ad-hoc Wi-Fi mode, which means no association has to be performed with them prior to transmitting. A train simply broadcasts packets to any nodes in its range. A node upon receiving these packets forwards them to the next node and so on, forming a chain of nodes. Following this chain, packets arrive at the destination. To make the design resilient against interference, transmissions are separated on multiple frequencies. Furthermore, redundancy is introduced in the design as a node forwards packets to not only one but two of its neighbors. This paper investigates the performance of the new design from the perspective of resiliency, redundancy and scalability, and presents the results both from a field experiment carried out using prototype hardware and an extensive simulations study.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms, nyantec GmbH, Siemens A/S
Contributors: Farooq, J., Bro, L., Karstensen, R. T., Soler, J.
Number of pages: 15
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: IEEE Transactions on Vehicular Technology
Volume: 67
Issue number: 1
Radio communication for Communications-Based Train Control (CBTC): A tutorial and survey

Over the last decade, railway industry has seen a huge transition from conventional railway signalling systems to modern, communication-based signalling systems. Communications-Based Train Control (CBTC) is a modern communication-based system that uses radio communication to transfer timely and accurate train control information. CBTC is the choice of mass-transit railway operators today, with over a hundred systems currently installed worldwide. The safety-related, time-critical applications such as train control impose stringent reliability and availability requirements on the radio communication technology used. IEEE 802.11 Wi-Fi, despite being originally developed for stationary users within a limited area, has prevailed as the de-facto radio technology for CBTC. Unfortunately, very limited literature is publicly available on this topic due to the highly competitive nature of the railway industry. We believe that this paper fills the much-needed gap. It aims to present a comprehensive tutorial, as well as a survey of the state-of-the-art, of CBTC and the role of radio communication in it. The operation and fundamental components of a CBTC system are discussed. A summary of the evolution of the communication technologies used for modern railway signalling is presented. The benefits and drawbacks of using a radio communication technology, particularly Wi-Fi, and the challenges it introduces, are discussed. Best practices in the design of a CBTC radio network and the measures to optimize its availability are discussed, while using the currently in-progress Copenhagen Strain CBTC project as a reference. An overview of the CBTC standardization efforts, as well as the IEEE CBTC standard—frequently overlooked due to its limited scope—is included. The paper is concluded by providing a number of potential directions for future work.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Farooq, J., Soler, J.
Pages: 1377-1402
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: IEEE Communications Surveys & Tutorials
Volume: 19
Issue number: 3
ISSN (Print): 1553-877X
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 26.26 SJR 3.661 SNIP 11.681
Web of Science (2017): Impact factor 20.23
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 23.8 SJR 3.494 SNIP 11.502
Web of Science (2016): Impact factor 17.188
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 16.88 SJR 2.992 SNIP 9.768
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 13.78 SJR 3.403 SNIP 8.638
Web of Science (2014): Impact factor 6.806
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 11.14 SJR 2.433 SNIP 8.508
Web of Science (2013): Impact factor 6.49
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 13.43 SJR 3.194 SNIP 10.063
Web of Science (2012): Impact factor 4.818
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 12.07 SJR 3.102 SNIP 9.525
Web of Science (2011): Impact factor 6.311
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.459 SNIP 5.495
Web of Science (2010): Impact factor 3.692
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.492 SNIP 4.359
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.927 SNIP 6.469
Scopus rating (2006): SJR 1.156 SNIP 5.096
Original language: English
Keywords: Railway signalling, Rail transport, Communication-based train control, CBTC, Radio communication, Radio Communication System (RCS), Wi-Fi, Wireless LAN, IEEE 802.11
Electronic versions:
COMST2661384.pdf
DOIs:
10.1109/COMST.2017.2661384

Bibliographical note
(c) 2017 IEEE. Personal use of this material is permitted. Permission from IEEE must be obtained for all other users, including reprinting/republishing this material for advertising or promotional purposes, creating new collective works for resale or redistribution to servers or lists, or reuse of any copyrighted components of this work in other works.
Research output: Research - peer-review › Journal article – Annual report year: 2017

SDN in GÉANT: Pilots and operational considerations

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms, GÉANT, Greek Research and Technology Network
Contributors: Roberts, G., Buscaglione, S., Stamos, K., Soler, J., Sevasti, A., Usman, M.
Number of pages: 3
Publication date: 2017
Peer-reviewed: Yes
Event: Paper presented at TNC17, Linz, Austria.
Electronic versions:
tnc17_paper_Tnc17SDNpilotsGN4AbstractV6_1_.pdf

Bibliographical note
Details, paper and presentation at TNC17 available at: https://tnc17.geant.org/core/presentation/16
Source: PublicationPreSubmission
Source-ID: 133791548
Research output: Research - peer-review › Paper – Annual report year: 2017

Streaming Multimedia via Overlay Networks using Wi-Fi Peer-to-Peer Connections

Short range ad-hoc wireless networks can be used to deliver streaming multimedia for information, entertainment and advertisement purposes. To enable short-range communication between various devices, the Wi-Fi Alliance proposed an extension to the IEEE802.11 Wi-Fi standard called Wi-Fi Peer-to-Peer (P2P). It allows compliant devices to form ad-hoc communication groups without interrupting conventional access point-based Wi-Fi communication. This paper proposes to use Wi-Fi P2P connectivity to distribute streaming multimedia in ad-hoc formed user groups. The exchange of multimedia data is performed by forming an overlay network using Peer-to-Peer Streaming Peer Protocol (PPSPP). In order to make PPSPP function over WiFi P2P connections, this paper proposes a number of changes to the protocol. The performance of the proposed system is evaluated using a computer networks emulator. The evaluation is done by streaming Live and Video-on-Demand multimedia among the different size user groups and
observing the streaming multimedia Quality-of-Service parameters.

Dynamic aggregation of traffic flows in SDN Applied to backhaul networks
A challenge in the adoption of the OpenFlow (OF)-based SDN paradigm is related to the limited number of OF rules supported by the network devices. The technology used to implement the OF rules is TCAM, which is expensive and power demanding. Due to this, the network devices are either very costly or they can support a very limited number of OF rules. One way to cope with this limitation, is to perform the same logic but with fewer OF rules in the devices. As a demonstration of this operational strategy, the current paper proposes a service for traffic flow aggregation which reduces the number of OF rules needed in the network devices, without impacting the control plane logic. The proposed traffic flow aggregation service is tested on a set of topologies specific to the backhaul network, since they aggregate a large amount of traffic flows. The results illustrate significant reductions in the number of OF rules in network devices, thus a lower demand on TCAM capacity.

Ensuring Long-Term Data Integrity
ETCS Data Integrity Requirements Can Be Fulfilled Even under Unfavorable Conditions with the Proper LTE Mechanisms.
Mitigating the controller performance bottlenecks in Software Defined Networks

The centralization of the control plane decision logic in Software Defined Networking (SDN) has raised concerns regarding the performance of the SDN Controller (SDNC) when the network scales up. A number of solutions have been proposed in the literature to address these concerns. This paper proposes a new approach for addressing the performance bottlenecks
that arise from limited computational resources at the SDNC. The proposed approach is based on optimally configuring
the operating parameters of the components residing inside the SDNC (network control functions such as monitoring,
routing, etc.). A series of tests have been performed, and results confirm that by careful configurations, the computational
overhead at the SDNC can be reduced without significantly affecting the efficiency of its components.

Model-Driven Policy Framework for Data Centers

Data Centers (DCs) continue to become increasingly complex, due to comprising multiple functional entities (e.g. routing,
orchestration). Managing the multitude of interconnected components in the DC becomes difficult and error prone, leading
to slow service provisioning, lack of QoS support, etc. Moreover, the lack of simple solutions for managing the
configuration and behavior of the DC components makes the DC hard to configure and slow in adapting to changes in
business needs. In this paper, we propose a model-driven framework for policy-based management for DCs, to simplify
not only the service provisioning but also the configuration management of the various DC components. The implemented
prototype is presented and a series of tests are performed to assess its performance and to gain key insights about policy
based management.
Towards Flexible SDN-based Management for Cloud-based Mobile Networks

New technologies and architectures arise in the telecommunications industry in order to cater to the ever growing demands in terms of resource utilization, manageability and user experience. C-RAN and SDN represent two such novel paradigms, both advocating for centralization of a set of resources or control capabilities respectively. The C-RAN architecture requires a significant amount of link capacity which may be a prohibitive factor in its adoption hence an obvious solution is to intelligently share the physical infrastructure among several virtual operators. In this context, a new challenge is to flexibly manage the sharing of the infrastructure. This paper argues that a centralized, SDN-based approach can bring the needed flexibility in the management of the C-RAN. More specifically, this paper proposes a policy-centric management framework, which uses the SDN architecture to enforce various rules for sharing the physical infrastructure. A testbed based on Floodlight and Mininet has been implemented to show the benefits of using this automatic management tool for sharing the mobile site capacity.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Artuso, M., Caba, C. M., Christiansen, H. L., Soler, J.
Number of pages: 7
Publication date: 2016

Host publication information
Title of host publication: Proceedings of IEEE/IFIP Network Operations and Management Symposium
Publisher: IEEE
Article number: 7502846
ISBN (Print): 978-1-5090-0223-8
Keywords: C-RAN, SDN, Network Slicing
Electronic versions: 149804_1_1_.pdf
DOIs: 10.1109/NOMS.2016.7502846
Source: PublicationPreSubmission
Source-ID: 122107216
Research output: Research - peer-review › Article in proceedings – Annual report year: 2016

Using relational databases to collect and store discrete-event simulation results

Computer-based discrete-event simulation is a popular method to simulate telecommunication networks. As these networks grow larger in size and complexity, fast collection of simulation results and efficient storage is paramount. The usual simulation simulation workflow is to run the simulation, export the results to a data carrier file and then process the results stored in a file using the data processing software. In this work, we propose to save the simulation results directly from a simulation tool to a computer database. We implemented a link between the discrete-even simulation tool and the database and performed performance evaluation of 3 different open-source database systems. We show, that with a right choice of a database system, simulation results can be collected and exported up to 2.67 times faster, and use 1.78 times less disk space when compared to using simulation software built-in results collection and storage method.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Poderys, J., Soler, J.
Number of pages: 6
Publication date: 2016

Host publication information
Title of host publication: Proceedings of 30th annual European Simulation and Modelling Conference
Keywords: Discrete-event simulation, Telecommunication networks, Performance evaluation, Database systems
Source: PublicationPreSubmission
Source-ID: 126844410
Research output: Research - peer-review › Article in proceedings – Annual report year: 2016
Utilizing Optical Circuits in Hybrid Packet/Circuit Data-Center Networks.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms, IBM Research Laboratory
Contributors: Ben-Itzhak, Y., Caba, C. M., Soler, J.
Number of pages: 1
Publication date: 2016
Peer-reviewed: Yes
Keywords: Hybrid Data Center Networks, Optical Switches
Research output: Research - peer-review > Poster – Annual report year: 2016

APIs for QoS configuration in Software Defined Networks
The OpenFlow (OF) protocol is widely used in Software Defined Networking (SDN) to realize the communication between the controller and forwarding devices. OF allows great flexibility in managing traffic flows. However, OF alone is not enough to build more complex SDN services that require complete control and management of the data plane (e.g. configurations of ports, queues, etc.). The current work contributes to the SDN ecosystem with the implementation of a plugin for the OVSDB protocol, for an existing SDN controller (SDNC). OVSDB complements OF with management functionality such as configuration of devices, ports, queues, etc. An Application Programming Interface (API) for dynamic configuration of QoS resources in the network devices is implemented herein, by using the capabilities of OVSDB. Further, the paper demonstrates the possibility to create network services with coarse granularity on top of the fine granular services exposed by the QoS configuration API at the SDNC. A series of tests emphasize the capabilities and the performance of the implemented QoS configuration API.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Caba, C. M., Soler, J.
Number of pages: 5
Publication date: 2015

Host publication information
Title of host publication: Proceedings of IEEE NetSoft 2015
Publisher: IEEE
ISBN (Print): 978-1-4799-7899-1
Keywords: Software Defined Networking, OpenFlow, QoS, Network management, Open vSwitch, Application programming interface
Electronic versions:
netsoft_2015_qos.pdf
DOIs:
10.1109/NETSOFT.2015.7116157
Research output: Research - peer-review > Article in proceedings – Annual report year: 2015

Communication Technologies for Vehicles: Proceedings of the 8th International Workshop, Nets4Cars/Nets4Trains/Nets4Aircraft 2015
This book constitutes the proceedings of the 8th International Workshop on Communication Technologies for Vehicles, Nets4Cars/Nets4Trains/Nets4Aircraft 2015, held in Sousse, Tunisia, in May 2015. The 20 papers presented in this volume were carefully reviewed and selected from 27 submissions. The contributions are organized in topical sections named: road; rail; and air.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms, Halmstad University, École nationale de l'aviation civile, HANA Laboratory, French Institute of Science and Technology for Transport, Spatial Planning, Development and Networks
Number of pages: 241
Publication date: 2015

Publication information
Publisher: Springer
Communication Technologies Support to Railway Infrastructure and Operations

GSM-Railways (GSM-R), which is state-of-the-art railway mobile communication technology, is gradually replacing legacy analogue radio systems. Although GSM-R is an unquestionable achievement in terms of European railway interoperability, from a telecommunication point of view, it is an obsolete technology. In the research work presented in this thesis, GSM-R technology is analysed and its main shortcomings are identified, namely: lack of capacity, limited data transmission capabilities, and inefficiency in radio resource usage. Due to these significant disadvantages, alternative mobile technologies are considered to replace GSM-R in the future. This thesis is focused on Long Term Evolution (LTE) as one of the most likely successors to GSM-R. As a technology designed for commercial purposes, LTE has to be investigated specifically in railway environment. Using computer-based simulations, the LTE network is examined in various scenarios modelling typical railway conditions. The transmission performance offered by LTE is analysed under worst-case assumptions in terms of traffic load, base station density, and user speed. The results demonstrate that LTE fulfils transmission requirements set for the two most important railway applications: European Train Control System (ETCS) signalling and railway-specific voice communication. Therefore, LTE is technically capable of replacing GSM-R as the communication network for the European Rail Traffic Management System (ERTMS). Moreover, the simulation results show that LTE offers a significant improvement over GSM-R in terms of transmission capacity and performance. Thus, LTE as a ii railway communication technology would create an opportunity to introduce new business-supporting applications, which could enhance railway operation. The demand for such applications is growing in railways, but the GSM-R networks cannot deliver them. Furthermore, a radio access architecture based on cooperating macro and micro cells is proposed in the thesis. This heterogeneous network architecture, which is novel for railways, may bring numerous advantages, such as high network availability and reduction of inter-cell handover rate for running trains. It also enables railways to use new high-frequency radio bands, which is not a feasible option in the classical railway radio deployments. Simulation results indicate that the macro/micro architecture offers huge capacity increase, which can be used for providing bandwidth-demanding applications, such as video surveillance. All in all, this thesis presents a feasible evolution in the field of railway communications. LTE technology together with the novel heterogeneous architecture may transform railway mobile networks from being a bottleneck of the system into becoming its strong asset.

General information

State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Sniady, A., Soler, J., Dittmann, L.
Number of pages: 252
Publication date: 2015

Publication information

Publisher: DTU Fotonik
Original language: English
Electronic versions:
alesn_PhD_Thesis_final_version_with_covers_compressed.pdf
DOIs:
10.11581/DTU:00000010
Source: PublicationPreSubmission
Source-ID: 110603371
Research output: Research › peer-review › Book – Annual report year: 2015

Mitigating SDN controller performance bottlenecks

The centralization of the control plane decision logic in Software Defined Networking (SDN) has raised concerns regarding the performance of the SDN Controller (SDNC) when the network scales up. A number of solutions have been proposed in the literature to address these concerns. This paper proposes a new approach for addressing the performance bottlenecks that arise from limited computational resources at the SDNC. The proposed approach is based on optimally configuring the operating parameters of the components residing inside the SDNC (network control functions such as monitoring, routing, etc.). A series of tests have been performed, and results confirm that by careful configurations, the computational overhead at the SDNC can be reduced without significantly affecting the efficiency of its components.

General information
PBL – Reflections after 10 years
The poster describes course 34357 at DTU, where PBL has been used in the last 10 years. While the course responsibles where not aware initially that the used methodology was PBL, the poster describes the triggering idea for the initial taken choices, i.e. homogenize working methodologies for students with different backgrounds (technical, cultural, personal) and prepare them to work independently towards their incipient arrival to the job market, within the context of an specific engineering realm

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Soler, J.
Number of pages: 1
Publication date: 2015
Peer-reviewed: Yes
Keywords: PBL, Alignment, Soft competences
Electronic versions:
abstract_POSTER_etalee2015_JSoler220515v2.pdf
Research output: Research - peer-review › Poster – Annual report year: 2015

SDN-based QoS Aware Network Service Provisioning
One of the applicability areas of SDN is for creating services for dynamic provisioning of network resources with strict QoS requirements. The research available in this field focuses mainly on the service logic implemented over the functionality of the SDN Controller (SDNC). However, there is much to be covered regarding the specific mechanisms used by the SDNC to enforce the QoS in the data plane devices. To this end, the current paper proposes a data plane QoS architecture, together with the invariants that have to be maintained by the SDNC in order to ensure predictable QoS for the network services. More specifically, the paper will look into on demand provisioning of Virtual Circuits (VCs) with specific QoS, based on the SDN paradigm. The aim is to analyze and compare the strategies for network resources management for two cases: a coarse granular and a fine granular VC provisioning service. Furthermore, the analysis is intended to serve as a basis for future implementations of SDNbased mechanisms for provisioning of bandwidth on demand.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Caba, C. M., Soler, J.
Pages: 119-133
Publication date: 2015

Host publication information
Title of host publication: Mobile, Secure, and Programmable Networking
Publisher: Springer
Editors: Boumerdassi, S., Bouzefrane, S., Renault, É.
ISBN (Print): 978-3-319-25743-3
(Lecture Notes in Computer Science, Vol. 9395).
Keywords: Software Defined Networking, Openflow, OVSDB, Information model, Services, QoS, Virtual circuit, Virtual switch
Software Defined Networking Demands on Software Technologies

Software Defined Networking (SDN) is a networking approach based on a centralized control plane architecture with standardised interfaces between control and data planes. SDN enables fast configuration and reconfiguration of the network to enhance resource utilization and service performances. This new approach enables a more dynamic and flexible network, which may adapt to user needs and application requirements. To this end, systemized solutions must be implemented in network software, aiming to provide secure network services that meet the required service performance levels. In this paper, we review this new approach to networking from an architectural point of view, and identify and discuss some critical quality issues that require new developments in software technologies. These issues we discuss along with use case scenarios. Here in this paper we aim to identify challenges for further evolution of software technologies in addressing problems of network evolution. Our view is based on the need for strong integration of network and software technologies, and therefore we establish the main focus of the paper on discussing SDN demands on software technologies. The main contribution is in categorization of open research problems and presenting ideas and opening new opportunities for future research.

VoLTE performance in railway scenarios

GSM-Railways (GSM-R) is the current standard for railway voice and data communication. GSM-R provides railway specific voice services, such as Railway Emergency Call (REC). GSM-R provides also the European Train Control System (ETCS), which offers in-cab signaling and Automatic Train Protection (ATP). Despite these features and services, GSM-R has various major shortcomings. Therefore, alternative technologies are considered to replace GSM-R and become the next generation railway mobile communication network. 3GPP Long Term Evolution (LTE) is a likely candidate for GSM-R replacement. LTE is more efficient, flexible and offers much higher capacity, which allows the railway network to provide new communication-based applications for railways. Most of the research on LTE in railways has been focused on data-based railway applications (ETCS signaling and other). Nevertheless, voice communication is still a crucial service for railways. Regardless of its advantages, LTE can only become a railway communication technology if it provides voice communication fulfilling railway requirements. This paper presents how Voice over LTE (VoLTE) can be used to build railway communication services. Examples of Railway Emergency Call and One-to-One Call are provided. Service performance, in terms of call setup times and voice transmission quality, is analyzed in simulation scenarios modelling two railway scenarios in Denmark.
VoLTE Performance in Railway Scenarios: Investigating VoLTE as a Viable Replacement for GSM-R

GSM-Railways (GSM-R) is the current standard for railway voice and data communication. GSM-R provides railway specific voice services, such as Railway Emergency Call (REC). GSM-R provides also the European Train Control System (ETCS), which offers in-cab signaling and Automatic Train Protection (ATP). Despite these features and services, GSM-R has various major shortcomings. Therefore, alternative technologies are considered to replace GSM-R and become the next generation railway mobile communication network. 3GPP Long Term Evolution (LTE) is a likely candidate for GSM-R replacement. LTE is more efficient, flexible and offers much higher capacity, which allows the railway network to provide new communication-based applications for railways. Most of the research on LTE in railways has been focused on data-based railway applications (ETCS signaling and other). Nevertheless, voice communication is still a crucial service for railways. Regardless of its advantages, LTE can only become a railway communication technology if it provides voice communication fulfilling railway requirements. This paper presents how Voice over LTE (VoLTE) can be used to build railway communication services. Examples of Railway Emergency Call and One-to-One Call are provided. Service performance, in terms of call setup times and voice transmission quality, is analyzed in simulation scenarios modelling two railway scenarios in Denmark.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms, Technical University of Denmark
Contributors: Sniady, A., Sønderskov, M., Soler, J.
Pages: 60-70
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: IEEE Vehicular Technology Magazine
Volume: 10
Issue number: 3
ISSN (Print): 1556-6072
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 4.57 SJR 0.867 SNIP 2.703
Web of Science (2017): Impact factor 6.038
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.53 SJR 0.808 SNIP 1.986
Web of Science (2016): Impact factor 4.429
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.65 SJR 0.707 SNIP 1.527
Web of Science (2015): Impact factor 2.783
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.85 SJR 0.748 SNIP 1.454
Web of Science (2014): Impact factor 1.75
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.47 SJR 0.638 SNIP 1.26
Web of Science (2013): Impact factor 1.567
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 1.37 SJR 0.501 SNIP 1.265
Capacity gain with an alternative LTE railway communication network

GSM - Railways (GSM - R) is the first international communication network designed specifically for railways. Most of the deployed GSM - R networks were initially used only to provide the railway voice communication. However, as more of these GSM - R networks begin to support the European Train Control System (ETCS) signaling, the capacity of GSM - R turns out to be insufficient. GSM - R cannot fulfill the railway requirements, in terms of the number of simultaneous ETCS connections. This is why, alternative, more efficient communication technologies should be considered by railways, such as 3GPP Long Term Evolution (LTE). This paper describes how to adapt the reversible multi-chain/channel queuing system to model an LTE cell serving ETCS-equipped trains. It is proposed to use the multiple user chains available in the model to represent varying bitrate in LTE radio access network. Using this model, LTE and GSM - R are compared in terms of capacity on an example at Copenhagen Main Train Station. The purpose of this work is to demonstrate the benefits that railway operators and infrastructure managers can expect from the introduction of LTE, as a telecommunication technology for railway control signaling and additional applications.

LTE for Railways: Impact on Performance of ETCS Railway Signaling

The Global System for Mobile Communications-Railways (GSM-R) is an obsolete mobile technology with considerable shortcomings in terms of capacity and data transmission capabilities. Because of these shortcomings, GSM-R is becoming the element limiting the number of running trains in areas with high train concentration, such as major train stations. Moreover, GSM-R cannot support advanced data services. Hence, modern technologies, such as long-term evolution (LTE), have to be evaluated as possible railway communication technologies to replace GSM-R in the future. This article analyzes the characteristics of the LTE railway radio access network in terms of eNodeB (LTE base station) density and eNodeB transmission power. Based on this analysis, a set of computer-based simulation scenarios (e.g., OPNET) with varying numbers of eNodeBs is evaluated regarding the achieved transfer delay and data integrity of European Train Control System (ETCS) messages.
LTE Micro-cell Deployment for High-Density Railway Areas

Long Term Evolution (LTE) is a serious candidate for the future releases of the European Rail Traffic Management System (ERTMS). LTE offers more capacity and supports new communication-based applications and services for railways. Nevertheless, even with this technology, the classical macro-cell radio deployments reach overload, especially in high-density areas, such as major train stations. In this paper, an LTE micro-cell deployment is investigated in high-density railway areas. Copenhagen Main Station is considered as a realistic deployment study case, with a set of relevant railway communication-based applications. The micro-cell deployment is compared with a classical macro-cell deployment in terms of transmission performance. Simulation results show a capacity improvement in the micro-cell deployment and its positive impact on critical (safety) and non-critical applications.

The MODUS approach to formal verification

Background: Software reliability is of great importance for the development of embedded systems that are often used in applications that have requirements for safety. Since the life cycle of embedded products is becoming shorter, productivity and quality simultaneously required and closely in the process of providing competitive products Objectives: In relation to this, MODUS (Method and supporting toolset advancing embedded systems quality) project aims to provide small and medium-sized businesses ways to improve their position in the embedded market through a pragmatic and viable solution Methods/Approach: This paper will describe the MODUS project with focus on the technical methodologies that can assist formal verification and formal model checking. Results: Based on automated analysis of the characteristics of the system and by controlling the choice of the existing opensource model verification engines, model verification producing inputs to be fed into these engines. Conclusions: The MODUS approach is aligned with present market needs; the familiarity with tools, the ease of use and compatibility/interoperability remain among the most important criteria when selecting the development environment for a project.
An IMS testbed for SIP applications
The paper presents the design and implementation of an emulation platform for the IP Multimedia Subsystem. The SIP Servlet API v1.1 has been used to implement the final system. The purpose of the emulation is to offer to IMS service developers an environment where they can integrate development, deployment and testing of their SIP applications in a single platform, easy to setup and maintain. The emulation platform offers the possibility of configuring network triggers (e.g. initial Filter Criteria and Service Point Triggers) through a web interface, and executing complex test scenarios according to the configuration. The result is ideal to introduce telecommunication students to service development, testing and deployment in a user friendly environment.

Can LTE become an alternative to GSM-R?
GSM-R is the first widely adopted international mobile communication network for railways. It is a part of the European Rail Traffic Management System (ERTMS), which substitutes legacy national railway signaling technologies. GSM-R is designed to provide two fundamental services: transmission of the European Train Control System (ETCS) messages and voice communication for railways. ETCS system offers safe and reliable in-cab signaling and train supervision, which reduces the risk of train driver error and increases the track occupancy. Thus, GSM-R, as a basis for ETCS, contributes to the safety and the performance of railways [1].

Evaluation of ETCS performance with LTE as alternative railway communication network using OPNET
GSM-R (GSM-R) is a communication mobile network designed to fulfill specific communication needs of railways. GSM-R is being widely deployed across Europe and other countries around the world for providing railway voice and train control services (ETCS). Despite that, GSM-R already shows various shortcomings in terms of capacity and support for additional data services. This triggers the issue whether railways could greatly benefit from an alternative communication technology. One of the possible alternatives is LTE. In our work we analyze delivery of railway services over an LTE network. This work is done using OPNET as simulator for modeling real life railway scenarios and communication infrastructure. These scenarios take advantage of OPNET features allowing modeling an end-to-end LTE network, as well
as trains movement over an exemplary real life railway line.

Future alternatives to GSM-R
Signalling is as fundamental contributor to a robust railway system. European Railway Traffic Management System (ERTMS) enhances dynamic train control, interoperability and track utilization. GSM-R is a communication subsystem in ERTMS.

Impact of the traffic load on performance of an alternative LTE railway communication network
Although many countries only now begin to invest in deployment of GSM-Railways (GSM-R) networks, this technology is already obsolete and reveals its significant shortcomings. The most troublesome one is the insufficient number of communication channels offered by GSM-R. This is a major problem obstructing railway operations at big train stations and junctions. Hence, other technologies, such as Long Term Evolution (LTE), need to be considered as an alternative to GSM-R. The goal of this paper is to demonstrate the capacity increase that railways can expect, from the introduction of LTE as internal communication infrastructure supporting railway signaling. This work is based on OPNET realistic network simulations, which show the relation between the traffic load (the number of trains transmitting and receiving data in an LTE cell) and the delay performance of the European Train Control System (ETCS) signaling, which is one of the essential railway communication services. Results of the simulations demonstrate that LTE can solve the urgent capacity problem faced by railways currently deploying GSM-R.
Introducing Process Competences in a PBL-based Engineering Course
The article describes an experiment in which elements related to generic professional competences, such as group work methodology, project planning, task delegation and communication, have been introduced in an existing course, tailored as a Problem Base Learning (PBL) course in Advanced Telecommunication at the Technical University of Denmark (DTU).

Methodology and Supporting Toolset Advancing Embedded Systems Quality
Software quality is of primary importance in the development of embedded systems that are often used in safety-critical applications. Moreover, as the life cycle of embedded products becomes increasingly tighter, productivity and quality are simultaneously required and closely interrelated towards delivering competitive products. In this context, the MODUS (Methodology and supporting toolset advancing embedded systems quality) project aims to provide a pragmatic and viable solution that will allow SMEs to substantially improve their positioning in the embedded-systems development market. This paper will describe the MODUS project with focus on the technical methodologies that will be developed advancing embedded system quality.
Performance of LTE in High Speed Railway Scenarios

GSM-Railways (GSM-R) is an obsolete mobile technology with a number of shortcomings in terms of capacity and capability. These shortcomings become a major issue for railways as GSM-R may limit the number of running trains in some areas and it cannot support advanced data services. Hence, alternative technologies, such as LTE, have to be considered as a future railway communication technology.

This paper presents an analysis of transfer delay and data integrity of European Train Control System (ETCS) messages transmitted over LTE network. The analysis is made using OPNET models of a high speed railway line and LTE systems.
Process Competences in PBL: Qualitative Assessment of an Experience

Constraining calendars and highly specialised curricular requirements make most teachers on engineering and related technical education focus mainly on fulfilling the technical requirements and objectives described in the curricula for their courses. Other fundamental aspects of the daily work of an engineer, in our current globalised and heterogeneous reality, are therefore not properly considered, when not completely disregarded, when designing course and curricular objectives. From this perspective, more professional skills like group formation, analysis and characterisation, group work methodologies, meetings, communication and discussions, coordination, delegation, analysis and self-critic of the group performance are not usually tackled. The result is a disadvantage for newly graduated students, when they have to enter in a highly competitive job market, where efficiency and quality of their output are the main reference elements for their evaluation.

This article presents an experience in which some of these elements have been introduced in an existing course, tailored as a Problem Base Learning (PBL) course in Advanced Telecommunication at the Technical University of Denmark (DTU). The results have been evaluated and assessed by the students, in the light of their own personal experiences and evolution during the course.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms, Office for Study Programmes and Student Affairs
Contributors: Soler, J., Andersson, P. H.
Number of pages: 8
Publication date: 2013

Host publication information
Title of host publication: 41th SEFI Conference
Keywords: PBL, Process Competences, Group performance
Electronic versions:
SEFI2013_Paper_FINAL.pdf
Source: dtu
Source-ID: u::8972
Research output: Research - peer-review › Article in proceedings – Annual report year: 2013

Om MPLS-teknologi, oplysninger og beslutnings grundlag

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Dittmann, L., Soler, J.
Publication date: 27 Mar 2012

Publication information
Original language: English
Research output: Commissioned › Report – Annual report year: 2012

An overview of GSM-R technology and its shortcomings
Railway communication technologies undergo a revolutionary change bringing them from the analog to the digital era. The European Rail Traffic Management System (ERTMS) replaces numerous incompatible analog radio systems, classical side-track signs and legacy in-cab signaling with an integrated comprehensive solution.
This paper presents an overview of GSM-Railways (GSM-R), which is the unified communication technology supporting ERTMS. Its shortcoming in terms of capacity and capability are discussed as a foundation for the need for further developments.
Enabling multimode wireless access networks using remote radio heads

The deployment of 4G networks is spreading rapidly providing mobile broadband services to the public. 4G technologies are designed to overlay existing 3G networks enabling reusability of several network components. In this way, the coexistence of 3G/4G standards is facilitated. This paper describes the advantages of using distributed base station architectures to provide multimode capabilities. In particular, it focuses on the radio unit, commonly known in industry as remote radio head. Multimode radio units capable of operating according to different wireless standards (WCDMA, LTE and WiMAX) can be proven extremely beneficial for operators especially in terms of operational and maintenance cost. Moreover, remote radio heads can enable effective spectrum management and allocation of radio resources. This is achieved through the advanced software configurability they provide and a flexible control and management plane. Switching between wireless standards becomes easily feasible through firmware upgrading. Finally, real-time configuration of radio functionalities, such as transmit power, receiver gain, carrier frequency, channel bandwidth and others result in a modular software defined radio platform. © 2012 ICST Institute for Computer Science, Social Informatics and Telecommunications Engineering.
Performance of Flow-Aware Networking in LTE backbone

According to traffic predictions, the growth in data networks usage will be increasing in the coming years, what will be especially visible in the mobile access networks. This brings new challenges in terms of traffic differentiation and network resource sharing, which need to be faced by wireless technologies, such as Long Term Evolution (LTE).

This paper proposes usage of a modified Flow Aware Networking (FAN) technique for enhancing Quality of Service (QoS) in the all-IP transport networks underlying LTE backbone. The results obtained with OPNET Modeler show that FAN, in spite of being relatively simple, provides good protection against congestion and decreases the need of over-provisioning.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Sniady, A., Soler, J.
Number of pages: 7
Publication date: 2012

Host publication information
Title of host publication: Proceedings of OPNETWORK2012
Publisher: OPNET
Electronic versions:
Performance_of_Flow_Aware_Networking_in_LTE_backbone.pdf
Research output: Research - peer-review › Article in proceedings – Annual report year: 2012

4G Mobile Broadband Networks: Analysis of Spectrum and Power Performance Using Distributed Base Station Architectures

This thesis has investigated a number of methods for optimizing energy and spectrum performance for 4G commercial radio access applications. The research interest is narrowed down to distributed base station architectures and in particular the remote radio module. Designing energy efficient radio access radio networks becomes a necessity not only due to the high operation and maintenance cost but also because of the major trend of providing ecofriendly solutions across the industry. The benefits of incorporating remote radio modules in next-generation mobile networks were investigated and a comparison with conventional base station architectures was realized. This analysis demonstrated that efficient hardware, intelligent software and self-organized subsystems can result in decreasing substantially power wastes. The advantages of optical fiber as transport medium for relaying baseband modulated signals to remote antenna sites were enlisted and the concept of Fiber To The Antenna (FTTA) was introduced. In terms of efficient hardware, the system requirements of the remote radio module have been analyzed thoroughly and a proposed architecture has been described in detail. In addition, digital signal processing techniques were developed for improving energy and spectrum performance. In particular a novel, lightweight crest factor reduction algorithm has been simulated, implemented in hardware and tested using the radio test platform provided by Radiocomp ApS. Finally, an adaptive polynomial digital predistortion block is proposed based on cartesian to polar conversion. It has been designed and implemented on a low-cost FPGA, overcoming the challenges imposed by the logical size and timing constraints.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Kardaras, G., Dittmann, L., Soler, J.
Publication date: Apr 2011

Publication information
Place of publication: Kgs. Lyngby, Denmark
Publisher: Technical University of Denmark (DTU)
Original language: English
Source: orbit
Source-ID: 316787
Research output: Research › Ph.D. thesis – Annual report year: 2011

A Novel Home Energy Management System Architecture

The number of electronic devices found in home environments is increasing, leading to an increase in the energy consumption in users' premises. Introducing a Home Energy Management System (HEMS) into user residences might provide the necessary tools to reduce and optimize the energy consumption in home environments. However, this is not an easy task as devices can use different communication technologies and be manufactured by different producers which can lead to interoperability issues. This paper presents a home gateway designed for a HEMS system that offers interoperability between the different devices at the service level and provides the necessary tools to apply energy management strategies.

General information
State: Published
A Novel Web Service Based Home Energy Management System

In the last years energy consumption in the home environments has increased considerably. There is an interest to provide users with means to reduce their energy consumption. Introducing a Home Energy Management System (HEMS) into user residences might provide the necessary tools to reduce and optimize the energy consumption in home environments. The main element of HEMS is the home gateway. In this paper, a home gateway suitable for HEMS is presented. The home gateway proposed uses rules to implement the home energy management system. The rules can be downloaded through web services from a rule server. Furthermore, web services are used to provide modularity to the home gateway by enabling the deployment of the different logical components into different devices, if necessary.

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Rossello Busquet, A., Soler, J.
Publication date: 2011

Host publication information
Title of host publication: Proceedings of the Third International Conference on Advances in Future Internet AFIN 2011
Keywords: Home Energy Management Systems (HEMS), Home gateway, Ontology, OSGi, Web-services
Electronic versions:
prod21318237985570.contribution_70098_AFIN_2011.pdf
URLs:
http://www.iaria.org/conferences2011/AFIN11.html
Source: orbit
Source-ID: 285075
Research output: Research - peer-review › Article in proceedings – Annual report year: 2011

Home Environment Service Knowledge Management System

This paper makes three contributions to assist households to control their home devices in an easy way and to simplify the software installation and configuration processes across multi-vendor environments. First, a Home Environment Service Knowledge Management System is proposed, which is based on the knowledge implemented by ontology and uses the inference function of reasoner to find out available software services according to household requests. Second, this paper provides a concrete methodology to exploit and acquire conflict-free information from ontology knowledge by using a reasoner. At last, a strategy of calculating the sequence of service dependency hierarchy is proposed by this paper.

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Zhang, J., Rossello Busquet, A., Soler, J., Berger, M. S., Dittmann, L.
Pages: 87-94
Publication date: 2011

Host publication information
Title of host publication: Proceedings of the 2011 11th International Conference on Telecommunications (ConTEL)
Publisher: IEEE
Energy consumption has increased considerably in the last years. How to reduce and make energy consumption more efficient in home environments has become of great interest for researchers. This could be achieved by introducing a Home Energy Management System (HEMS) into user residences. This system might allow the user to control the devices in the home network through an interface and apply energy management strategies to reduce and optimize their consumption. Furthermore, the number of devices and appliances found in users residences is increasing and these devices are usually manufactured by different producers and can use different communication technologies. This paper tackles this problem. A home gateway which integrates different devices with a HEMS based on set of semantic-web tools providing a common control interface and energy management strategies.
Reducing Electricity Demand Peaks by Scheduling Home Appliances Usage

Nowadays there is a tendency to consume electricity during the same period of the day leading to demand peaks. Regular energy consumption habits lead to demand peaks at specific temporal intervals, because users consume power at the same time. In order to avoid demand peaks, users' appliances should consume electricity in a more temporarily distributed way. A new methodology to schedule the usage of home appliances is proposed and analyzed in this paper. The main concept behind this approach is the aggregation of home appliances into priority classes and the definition of a maximum power consumption limit, which is not allowed to be exceeded during peak hours. The scenario simulated describes a modern household, where the electrical devices are classified in low and high priority groups. The high priority devices are always granted power in order to operate without temporal restrictions. On the contrary, the low priority devices have to pause their operation, when the algorithm dictates it, and resume it in the future. This can become beneficial for both energy companies and users. The electricity suppliers companies will be capable of regulating power generation during demand peaks periods. Moreover, users can be granted lower electricity bill rates for accepting delaying the operation of some of their appliances. In order to analyze this scenario, teletraffic engineering theory, which is used in evaluating the performance of telecommunication networks, is used. A reversible fair scheduling (RFS) algorithm, which was originally developed for telecommunication networks, is applied. The purpose is to analyze how a power consumption limit and priorities for home appliances will affect the demand peak and the users’ everyday life. Verification of the effectiveness of the RFS algorithm is done by means of simulation and by using real data for power consumption and operation hours. The defined maximum power limit of 750 and 1000 Watt was not exceeded during peak demand hours. The trade-off was an average delay of 36.1 and 12.36 minutes, respectively, for the aggregated low priority class.

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Rossello Busquet, A., Kardaras, G., Iversen, V. B., Soler, J., Dittmann, L.
Number of pages: 418
Pages: 156-163
Publication date: 2011

Host publication information
Editors: Sønderberg Petersen, L., Larsen, H. H.
Electronic versions:
RIEC_2011_Proceedings.pdf

Bibliographical note
Risø-R-1776(EN)
Source: orbit
Source-ID: 285073
Research output: Research - peer-review › Article in proceedings – Annual report year: 2011

Towards Efficient Energy Management: Defining HEMS, AMI and Smart Grid Objectives

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Rossello Busquet, A., Kardaras, G., Soler, J., Dittmann, L.
Publication date: 2011

Host publication information
Title of host publication: Conference Proceedings of The Tenth International Conference on Networks
URLs:

Bibliographical note
The paper has received a conference 'Best Paper' award. The award is based on the reviews of the original submission, the camera-ready version, and the presentation during the conference.
Source: orbit
Source-ID: 274886
Research output: Research - peer-review › Article in proceedings – Annual report year: 2011
Towards Efficient Energy Management: Defining HEMS and Smart Grid Objectives

Energy consumption has increased considerably in the last years. The way to reduce and make energy consumption more efficient has become of great interest for researchers. One of the research areas is the reduction of energy consumption in users’ residences. In order to reduce energy consumption in home environments, researches have been designing Home Energy Management Systems (HEMS). Efficiently managing and distributing electricity in the grid will also help to reduce the increase of energy consumption in the future. The power grid is evolving into the Smart Grid, which is being developed to distribute and produce electricity more efficiently. This paper presents the high level goals and requirements of HEMS and the Smart Grid. Additionally, it provides an overview on how Information and Communication Technologies (ICT) is involved in the Smart Grid and how they help to achieve the emerging functionalities that the Smart Grid can provide.

General information
State: Published
Organisations: Department of Photonics Engineering, Networks Technology and Service Platforms
Contributors: Rossello Busquet, A., Soler, J.
Pages: 249-263
Publication date: 2011
Peer-reviewed: Yes

Publication Information
Journal: International Journal on Advances in Telecommunications
Volume: 4
Issue number: 3&4
ISSN (Print): 1942-2601
Original language: English
Keywords: Home Gateway, Home Energy Management System (HEMS), Smart Grid, Power grid, Advanced Metering Infrastructure (AMI), Demand-Response (DR), Information and Communication Technologies (ICT)
URLs:
http://www.iariajournals.org/telecommunications/
Source: dtu
Source-ID: u::3723
Research output: Research - peer-review › Journal article – Annual report year: 2012

Virtualization-support Cases in Engineering Education

The paper presents cases of applying hardware virtualization techniques as support for education activities in two different courses and a master thesis within the degree International MSc on Telecommunication Engineering at the Technical University of Denmark (DTU). The triggering problem is presented in each of the cases, together with the benefits and drawbacks of using virtualization to cope with it.

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Soler, J.
Number of pages: 3
Publication date: 2011

Host publication information
Title of host publication: 3rd International Congress on Engineering Education (ICEED 2011) : Proceedings
Publisher: IEEE
ISBN (Print): 978-1-4577-1258-6
Keywords: IMS, Services, Virtualization, Cloud
Electronic versions:
CameraReady_withICEEDTemplate.pdf
DOIs:
10.1109/ICEED.2011.6235348
Source: orbit
Source-ID: 314609
Research output: Research - peer-review › Article in proceedings – Annual report year: 2011

Analysis of control and management plane for hybrid fiber radio architectures

This paper presents the existing Radio over Fiber (RoF) architectures and focuses on the control and management plane of the Remote Antenna Unit (RAU). Broadband wireless standards, such as WiMAX and LTE, incorporate optical technologies following the distributed base station concept. The control and management of the RAU becomes a critical
task, since it can facilitate allocation of resources, configuration and upgrade of the remote unit and constant monitoring of its performance. In the case of baseband over fiber, two protocols (OBSAI and CPRI) introduce a well-defined control and management plane. In the case of intermediate/radio frequency over fiber, this paper presents a simple approach, which can provide configurability and real-time monitoring of the RAU over the same optical link. This is realized by multiplexing high frequency user data with baseband frequency control data at the Central Office (CO) and demultiplexing them at the RAU. The advantage of this approach is the add-on flexibility and simplicity of its implementation. The limitations concern mainly the extra development and integration needed to take place in the RAU.

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Kardaras, G., Pham, T. T., Soler, J., Dittmann, L.
Publication date: 2010

Fiber to the antenna: A step towards multimode radio architectures for 4G mobile broadband communications
During the evolution of mobile networks, reusability of network components has been always a main concern. At the same time, keeping operational and maintenance cost at reasonable levels is a major task. This paper presents and quantifies the advantages of using multimode remote radios capable of operating according to various standards (WCDMA, WiMAX and LTE) for resolving these challenges.

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Kardaras, G., Soler, J., Brewka, L. J., Dittmann, L.
Publication date: 2010

Greening radio access networks using distributed base station architectures

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Kardaras, G., Soler, J., Dittmann, L.
Publication date: 2010

Regulating electricity demand peaks for home appliances using reversible fair scheduling
This paper describes a novel methodology for regulating electricity demand peaks for home appliances. To achieve this objective, we will make use of the reversible fair scheduling algorithm originally developed for telecommunication networks. The main concept behind this approach is the aggregation of home appliances into priority classes and the definition of a maximum power consumption threshold which is not allowed to be exceeded during peak hours. According to the bandwidth demand and priority of each class, the reversible fair scheduling algorithm delays some of the appliances and prolongs their operation. In this way, it is guaranteed that the power consumption is maintained below the maximum allowed limit. The latter can become beneficial for both energy companies and users. Energy companies will be capable of regulating power generation during peak demand, which has always been a major task. Moreover, users will be granted
lower electricity bill rates for accepting prolonging the operation of some of their home appliances.

Scheduling home appliances for energy efficient buildings
The number of appliances found in users' homes is increasing together with electricity consumption of users' residences. In addition, there is a tendency to consume during the same period leading to demand peaks. During these periods, electricity providers are forced to develop costly methods to generate enough power to meet consumers' requirements. In addition, high demand peaks can lead to electricity shortages or even blackouts in certain areas. In order to avoid demand peaks, users' appliances should consume electricity in a more distributed way. A new methodology to schedule the usage of home appliances is proposed and analyzed. The main concept behind this approach is the aggregation of home appliances into priority classes and the definition of a maximum power consumption threshold, which is not allowed to be exceeded during peak hours. The scenario simulated describes a modern household, where the electrical devices are classified into low and high priority groups. The high priority devices are always granted power in order to operate normally. On the contrary, the low priority devices are granted or denied access to electrical power according to; their energy consumption and the available margin before exceeding a maximum consumption threshold. In case the appliance is denied access to consume, it will have to wait until it is possible to turn it on without exceeding the maximum threshold. In this way, it is guaranteed that the power consumption is maintained below the maximum allowed limit. This can become beneficial for both energy companies and users. The electricity suppliers companies will be capable of regulating power generation during demand peaks. Moreover, users can be granted lower electricity bill rates for accepting delaying the operation of some of their appliances. To analyze this scenario we make use of teletraffic engineering theory useful in evaluating the performance of telecommunication networks. We apply a reversible fair scheduling (RFS) algorithm, which was originally developed for telecommunication networks. The purpose is to analyze how a power consumption threshold and priorities for home appliances will affect the demand peak and the users' everyday life. We verify by means of simulation the effectiveness of the RFS algorithm with real data for power consumption and operation hours. The defined maximum power threshold of 1500 Watt was not exceeded during peak demand hours. The trade-off was a delay of approximately 25 min for the aggregated low priority class.
Telecommunication Services in Current and Future Converged Networks, carried out at the Technical University of Denmark in the period [April 2002-April 2005]. Even though the technologies presented in the text have evolved from that period until now, the presented scenarios and setups are still valid as interesting initial steps in the realm.

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Soler, J.
Number of pages: 87
Publication date: 2010

Simplified polynomial digital predistortion for multimode software defined radios
Increasing the efficiency of mobile communication networks while keeping operational and maintenance cost at reasonable level is a major task for operators. Multimode radios capable of operating according to various mobile broadband standards, such as WCDMA, WiMAX and LTE, represent the new trend for resolving these challenges. A transparent radio solution, agnostic to wireless standards, with high capacity and low power consumption is the overall target. Regulating power consumption for radio modules can be achieved by introducing linearization methods for power amplifiers. This paper presents a simplified approach using polynomial digital predistortion in the intermediate frequency (IF) domain. It is fully implementable in software and no hardware changes are required on the digital or analog platform. The adaptation algorithm selected was Least Mean Squares because of its relevant simplicity compared to more sophisticated adaptation algorithms, which are expensive in FPGA hardware resources. Simulation results show improvement of Adjacent Channel Power Ratio (ACPR) over 20dB by reducing the 3rd and 5th order intermodulation products providing compliance to the strict spectrum mask requirements. In the mean time, the Error Vector Magnitude (EVM) is maintained below 2% meeting the requirements for WiMAX and LTE wireless standards.

General information
State: Published
Organisations: Networks Technology and Service Platforms, Department of Photonics Engineering
Contributors: Kardaras, G., Soler, J., Dittmann, L.
Publication date: 2010

Hvordan virker internettet: Grafer, knudepunkter og netværk

General information
State: Published
Organisations: Networks, Department of Photonics Engineering
Number of pages: 259
Pages: 215-237
Publication date: 2007

Host publication information
Title of host publication: Optiske Horisonter : en rejse på kommunikationsteknologiens vinger
Place of publication: Odense
Publisher: COM.DTU
Edition: 1
ISBN (Print): 87-92062-01-6
Source: orbit
Source-ID: 202184
Personalized Home-Networks: Identity-driven network behaviour and configuration

The paper provides details of a home-networking architecture based on an enhanced residential gateway. Initially the need for mechanisms allowing user-dependent network behavior is described and afterwards details of an initial implementation are provided in terms of architectural description, enabling technical components and interaction.

General information
State: Published
Organisations: Networks, Department of Photonics Engineering, Teletel S.A.
Contributors: Soler, J., Gandy, M.
Number of pages: 45
Publication date: 2007

Host publication information
Title of host publication: 6th International Conference on Networking (ICN07)
Publisher: IEEE
ISBN (Print): 0-7695-2805-8
Electronic versions:
Soler.pdf
DOIs:
10.1109/ICN.2007.73

Bibliographical note
Copyright: 2007 IEEE. Personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution to servers or lists, or to reuse any copyrighted component of this work in other works must be obtained from the IEEE
Source: orbit
Source-ID: 199389
Research output: Research - peer-review › Article in proceedings – Annual report year: 2007

Framework for Development of Advanced Telecommunication Services in Current and Future Converged Networks

This thesis presents different experiences related to architectures and mechanisms for deployment of telephony services, understood as especial features complementing the basic voice service. The context for these experiences is the transition of telecommunication (telephony) networks from circuit switched based systems towards packet based ones. Service deployment in a specific hybrid PSTN/IN/VOIP architecture is presented as well as a description of the enabling technologies. Discussion on service implementation examples is provided. The convenience of network neutral service invocation is introduced and how this has been achieved, by means of Web Services-based mechanisms. A single-request / single response protocol for invocation of a specific set of services is presented and a decoupling mechanism between signalling network protocols and service logic invocation demonstrated. Services, have been designed, implemented and tested as part of this demonstration. Performance characterization of different service implementations is also provided. Finally, a data model for an overlay network to existing telecommunication (telephony) infrastructures, allowing operational convergence is described.

General information
State: Published
Organisations: Networks, Department of Photonics Engineering
Contributors: Soler-Lucas, J., Dittmann, L., Fosgerau, A.
Number of pages: 112
Publication date: Mar 2006

Publication information
ISBN (Print): 87-90974-84-0
Original language: English
Electronic versions:
Jose_Soler_FINAL_May2006_030506.pdf
Source: orbit
Source-ID: 184237
Research output: Research › Ph.D. thesis – Annual report year: 2006

A Practical Implementation of GUP Architecture and its Migration Path to IMS

General information
Generic User Profile (GUP) in the FlexiNET Architecture

**General information**
State: Published
Organisations: Networks, Department of Photonics Engineering
Contributors: Diehl, A., Soler, J., Kavadias, C., Tombros, S.
Publication date: 2006
Peer-reviewed: Yes
Event: Poster session presented at IST Mobile & Wireless Communications Summit, Myconos, Greece.
Source: orbit
Source-ID: 194210
Research output: Research - peer-review › Poster – Annual report year: 2006

New Architecture for a Centralized Next Generation Profile Register in Future Mobile Tele

**General information**
State: Published
Organisations: Department of Photonics Engineering
Contributors: Soler, J., Diehl, A., Fuhrmann, W., Bleimann, U., Reynolds, P., Ghita, B.
Publication date: 2006

**Host publication information**
Title of host publication: New Architecture for a Centralized Next Generation Profile Register in Future Mobile Tel Source: orbit
Source-ID: 191094
Research output: Research - peer-review › Article in proceedings – Annual report year: 2006

FlexiNET: Flexible Network Architecture for Enhanced Access Network Services and Applications

**General information**
State: Published
Organisations: Networks, Department of Photonics Engineering
Publication date: 2005

**Host publication information**
Title of host publication: Proc. of 14th IST Mobile & Wireless Communications Summit Source: orbit
Source-ID: 181134
Research output: Research - peer-review › Article in proceedings – Annual report year: 2005

Applying IT strategies as Interoperability Solution in Telecommunication Networks

**General information**
State: Published
Organisations: Networks, Department of Photonics Engineering
Contributors: Soler-Lucas, J., Fosgerau, A.
Publication date: 2004
First combined report on the multi-technological and multi-disciplinary analysis of the ‘broadband for all’ concept
This report is the first deliverable of the FP-6 project “Broadband in Europe for all: a multi-disciplinary approach project (BREAD)”. It is a combined deliverable on the multi-technological and multi-disciplinary analysis of the “broadband for all” concept with focus on the ‘state of the art’ and ‘what’s happening now’. The major objective of this report is the first deliverable of the FP6-project “Broadband in Europe for all: a multi-disciplinary approach this deliverable is to identify and outline the most important areas in relation to the multi-technological and multi-disciplinary analysis of the “broadband for all” concept to be carried out as part of the project. The deliverable contains information on ongoing regional and national broadband initiatives in Europe and around the world. The information includes a description of state-of-the-art technologies in the different domains regarding “broadband for all” and a description concerning future trends and related issues, which will be investigated during the project. Further current broadband content and applications are described and analysed to determine future trends regarding usage of broadband applications and content. Finally a general description of the market developments within communication networks and in particular broadband networks and general regulatory aspects and the implications of these are described. These general descriptions are based on a number of country cases.

Report on the EU IST project GEMINI

General information
State: Published
Organisations: Department of Photonics Engineering
Contributors: Soler-Lucas, J.
Pages: 1
Publication date: 2004
Peer-reviewed: No

Publication information
Journal: IEEE Global Communications Newsletter
Original language: English
Source: orbit
Source-ID: 154340
Research output: Research › Journal article – Annual report year: 2004

SIP Servlets: an Efficient Scheme for Implementing Advanced Telecommunication Services

General information
State: Published
Organisations: Networks, Department of Photonics Engineering
Contributors: Soler-Lucas, J.
Publication date: 2004

Host publication information
Title of host publication: Prof. of 3rd International Conference on Networking
ISBN (Print): 0-86341-325-0
Source: orbit
Webservices as enablers of converged telephony services

General information
State: Published
Organisations: Networks, Department of Photonics Engineering
Contributors: Soler-Lucas, J., Fosgerau, A.
Publication date: 2004

Host publication information
Title of host publication: Proc. of 7th International Symposium on Communication Interworking
Volume: CD
Source-ID: 154414
Research output: Research - peer-review › Article in proceedings – Annual report year: 2004

Intelligent Services in Converged Networks - Evolution steps in the signalling arena

The paper aims to present the authors' view of the future of telephony. While voice transport over IP is no longer a dream but a reality, the capacity to offer IN-like services, as value added services within VoIP environments, has still been rarely treated and implemented. We present an overview on the subject and the work currently in development, within the IST project GEMINI, towards the implementation of IN IP-based services and its interoperability with traditional PSTN-SS7-IN networks.

General information
State: Published
Organisations: Department of Photonics Engineering
Contributors: Soler-Lucas, J., Fosgerau, A., Grabner, B.
Pages: 530-535
Publication date: 2003

Host publication information
Title of host publication: Proceedings of 10th International Conference on Telecommunications
Volume: 1
Publisher: IEEE
ISBN (Print): 0-7803-7661-7
Electronic versions:
Lucas.pdf
DOIs:
10.1109/ICTEL.2003.1191465

Bibliographical note
Copyright: 2003 IEEE. Personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution to servers or lists, or to reuse any copyrighted component of this work in other works must be obtained from the IEEE
Source-ID: 61763
Research output: Research - peer-review › Article in proceedings – Annual report year: 2003

Simulation and Performance Analysis of a GLMPS Lambda Scheduler

General information
State: Published
Organisations: Department of Photonics Engineering
Contributors: Iversen, V. B., Soler-Lucas, J., Nord, M.
Pages: 9
Publication date: 2003
Peer-reviewed: No

Publication information
Journal: COST 279
Volume: 03-006
Original language: English
Modelling and Analysis of a Lambda-Scheduller for a GMPLS Node

General information
State: Published
Organisations: Networks, Department of Photonics Engineering
Contributors: Iversen, V. B., Soler-Lucas, J., Nord, M.
Publication date: 2002
Peer-reviewed: No
Event: Poster session presented at Grasmere, Grasmere, United Kingdom.
Source: orbit
Research output: Research › Poster – Annual report year: 2002

The Internet Protocol and Optical Networking Workshop

General information
State: Published
Organisations: Networks, Department of Photonics Engineering
Contributors: Soler-Lucas, J.
Publication date: 2002
Peer-reviewed: No
Event: Poster session presented at Grasmere, Grasmere, United Kingdom.
Source: orbit
Research output: Research › Poster – Annual report year: 2002

Projects:

EMULRADIO4RAIL (826152-H2020-S2RJU-2018)
Soler, J., Project Manager, Networks Technology and Service Platforms, Department of Photonics Engineering
Yan, Y., PI, Networks Technology and Service Platforms, Department of Photonics Engineering
Dittmann, L., Project Participant, Networks Technology and Service Platforms, Department of Photonics Engineering
01/01/2019 → 30/06/2020
Keywords: ERTMs, LTE, WiFi, network, emulation, simulation
Collaborators: IFSTTAR - French institute of science and technology for transport, development and networks, IK4-Ikerlan Technology Research Centre, Consorzio Univesita Industria- Laboratori di Radiocomunicazion, Université de Lille, Metro de Madrid, Eurnex e. V.
Project: Research

Next generation SDN/NFV-based Management of Service
Ollora Zaballa, E., PhD Student, Department of Photonics Engineering
Christiansen, H. L., Main Supervisor, Department of Photonics Engineering
Soler, J., Supervisor, Department of Photonics Engineering
Samfinansieret - Andet
01/08/2017 → 29/10/2020
Award relations: Next generation SDN/NFV-based Management of Service
Project: PhD

NGPaaS: H2020-5GPPP - Next Generation Platform as a Service
Soler, J., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Dittmann, L., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
01/06/2017 → 01/06/2019
Project: Research

X2Rail-1: H2020-Shift2Rails-Start-up activities for Advanced Signalling and Automation Systems
Soler, J., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Dittmann, L., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
01/12/2016 → 31/12/2018
Project: Research

Safe 4Rails: H2020-Shift2Rails-Safe Architecture for Robust Distributed Application Integration in Rolling Stock
Soler, J., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Yan, Y., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Dittmann, L., Project Participant, Networks Technology and Service Platforms, Department of Photonics Engineering
01/03/2017 → 30/06/2018
Project: Research

P2P Communication solutions for resilient and scalable operation of collaboration tools
Poderys, J., PhD Student, Department of Photonics Engineering
Soler, J., Main Supervisor, Department of Photonics Engineering
Dittmann, L., Supervisor, Department of Photonics Engineering
Berger, M. S., Examiner, Department of Photonics Engineering
Malaina, F. L., Examiner
Zhang, Q., Examiner, Department of Photonics Engineering
Institut stipendie (DTU)
01/04/2015 → 06/06/2018
Award relations: P2P Communication solutions for resilient and scalable operation of collaboration tools
Project: PhD

Network management, control and operation of flexible optical networks and applications using Open Flow and SDO
Andrus, B., PhD Student, Department of Photonics Engineering
Tafur Monroy, I., Main Supervisor, Department of Photonics Engineering
Vegas Olmos, J. J., Supervisor, Department of Photonics Engineering
Vegas Olmos, J. J., Supervisor, Department of Photonics Engineering
Soler, J., Examiner, Department of Photonics Engineering
Kuipers, F., Examiner
Wosinska, L., Examiner
Marie Curie (EU-stipendium)
15/10/2014 → 06/12/2017
Award relations: Network management, control and operation of flexible optical networks and applications using Open Flow and SDO
Project: PhD

Quality of experience enabled network for intelligent and reliable service management
Kardaras, G., PhD Student, Department of Photonics Engineering
Dittmann, L., Main Supervisor, Department of Photonics Engineering
Soler, J., Supervisor, Department of Photonics Engineering
Berger, M. S., Examiner, Department of Photonics Engineering
Kavadias, C. D., Examiner
Madsen, J. K., Examiner
ErhvervsPhD-ordningen VTU
01/02/2008 → 19/04/2012
Award relations: Quality of experience enabled network for intelligent and reliable service management
Project: PhD

Framework for deployment of advanced telecommunication services in current and future converged networks
Soler, J., PhD Student, Department of Photonics Engineering
Dittmann, L., Main Supervisor, Department of Photonics Engineering
Fosgerau, A., Supervisor, IT Service
Rose, M., Examiner, Department of Applied Mathematics and Computer Science
Færgemand, O., Examiner
Gurbani, V. K., Examiner
Anden EU-finansiering
01/04/2002 → 23/03/2006
Award relations: Framework for deployment of advanced telecommunication services in current and future converged networks
Project: PhD
**Transport network based on T-mpls**
Zhang, J., PhD Student, Department of Photonics Engineering
Dittmann, L., Main Supervisor, Department of Photonics Engineering
Berger, M. S., Supervisor, Department of Photonics Engineering
Soler, J., Examiner, Department of Photonics Engineering
Phillips, C. I., Examiner
Zimmermann, A., Examiner
Institut stipendie (DTU) Samf.
01/07/2008 → 21/02/2012
Award relations: Transport network based on T-mpls
Project: PhD

**Communication Technology Support for Railway Systems**
Sniady, A., PhD Student, Department of Photonics Engineering
Soler, J., Main Supervisor, Department of Photonics Engineering
Dittmann, L., Supervisor, Department of Photonics Engineering
Christiansen, H. L., Examiner, Department of Photonics Engineering
Aguado, M., Examiner
Degnegaard, S., Examiner
Eksternt finansieret virksomhed
01/03/2012 → 18/06/2015
Award relations: Communication Technology Support for Railway Systems
Project: PhD

**Software Defined Networking: applicability and service possibilities**
Caba, C. M., PhD Student, Department of Photonics Engineering
Soler, J., Main Supervisor, Department of Photonics Engineering
Dittmann, L., Supervisor, Department of Photonics Engineering
Berger, M. S., Examiner, Department of Photonics Engineering
Jacob, E., Examiner
Phillips, C. I., Examiner
Institut stipendie (DTU)
01/03/2013 → 02/11/2016
Award relations: Software Defined Networking: applicability and service possibilities
Project: PhD

**Intelligent control of home appliances via network**
Rossello Busquet, A., PhD Student, Department of Photonics Engineering
Dittmann, L., Main Supervisor, Department of Photonics Engineering
Soler, J., Supervisor, Department of Photonics Engineering
Wessing, H., Examiner, Department of Photonics Engineering
Demazeau, Y., Examiner
Hallenborg, K., Examiner
Institut stipendie (DTU) Samf.
01/10/2009 → 30/09/2013
Award relations: Intelligent control of home appliances via network
Project: PhD

**Cross layer optimization in Heterogeneous Networks**
Popovska Avramova, A., PhD Student, Department of Photonics Engineering
Dittmann, L., Main Supervisor, Department of Photonics Engineering
Ruepp, S. R., Supervisor, Department of Photonics Engineering
Yan, Y., Supervisor, Department of Photonics Engineering
Soler, J., Examiner, Department of Photonics Engineering
Popovski, P., Examiner
Roullet, L., Examiner
Institut stipendie (DTU)
01/08/2010 → 15/06/2016
Award relations: Cross layer optimization in Heterogeneous Networks
Project: PhD
GN4-2 JRA1 Task 2: SDN/NFV capabilities in GEANT
Soler, J., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
16/06/2016 → 15/02/2019
Project: Research

SDN-enabled Management of Heterogeneous Optical & Wireless Network Infrastructure
Soler, J., Supervisor, Department of Photonics Engineering, Networks Technology and Service Platforms
Berger, M. S., Main Supervisor, Department of Photonics Engineering, Networks Technology and Service Platforms
Kentis, A. M., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
01/03/2016 → 28/02/2019
Project: Research

COSIGN: Integrating Advanced Optical Hardware and SDN for Future All-Optical Data Center Networks
Soler, J., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Dittmann, L., Project Coordinator, Department of Photonics Engineering, Networks Technology and Service Platforms
Berger, M. S., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Ruepp, S. R., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Caba, C. M., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Fagertun, A. M., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Oxenløwe, L. K., Project Participant, Department of Photonics Engineering, High-Speed Optical Communication
Galili, M., Project Participant, Department of Photonics Engineering, High-Speed Optical Communication
Nilsen, H., Project Coordinator, Department of Photonics Engineering, Networks Technology and Service Platforms
Udsen, H., Project Manager, Department of Photonics Engineering, Networks Technology and Service Platforms
FP7 Contract ID: 619572
01/01/2014 → 31/12/2016
Project: Research

P2P communication solution for resilient and scalable operation of collaboration tools
Soler, J., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Poderys, J., Project Participant, Department of Photonics Engineering
01/04/2015 → 31/03/2018
Project: Research

An adaptive train on-board radio communication system for heterogeneous railway signalling systems
Soler, J., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Farooq, J., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Dittmann, L., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
01/09/2014 → 31/08/2017
Project: Research

MODUS: Methodology and Supporting Toolset advancing Embedded Systems Quality
EU FP7 Program
Berger, M. S., Project Participant, Networks Technology and Service Platforms, Department of Photonics Engineering
Soler, J., Project Participant, Department of Photonics Engineering, Networks Technology and Service Platforms
Brewka, L. J., Project Participant, Networks Technology and Service Platforms, Department of Photonics Engineering
01/09/2011 → 31/05/2014
Project: Research

ESTIA: Enhanced networked environment for personalised provision of AV content and appliances control information
ESTIA project focuses on the design and development of technologies for efficient personalised management of audiovisual content and white goods functions, locally within the home. This goal will be achieved by specifying the required resources at network infrastructure, communications components (residential gateways and communication interfaces), machine-to-machine, middleware and service levels, with a view to enable seamless audiovisual content manipulation on users terminals in personalised manner. Behind ESTIA concept, the main research challenge is to remove complexity from user terminals and applications and enhance the role of the residential gateways, currently used for simple interconnection purposes, by enabling designation of local management functions for customised services creation, on the basis of user identity management. This way, users will be allowed to personalise home networking applications (e.g. entertainment and appliances control) according to their needs, by simply composing the service components located at the residential gateway. The project will explore two broad home networking information types, namely the Audiovisual (AV) session management and the white goods control functions. ESTIA home networking
architecture will select and use available networking technologies to develop innovative AV streams manipulation schemes and inter-working with the public networks. Based on this physical infrastructure, the project will define a set of higher-layer interfaces for machine-to-machine and man-to-machine interoperability, leveraging the means of seamless services discovery and media streams manipulation and deployment in personalised manner.

Soler, J., Project Participant, Department of Photonics Engineering
Forsk. EU - Rammeprogram
01/01/2006 → 31/03/2008
Collaborators: Keletron (Eliktronikes Efarmogones Etairei Menis Efthyneis, BSH Hausgerate GmbH, Gorenje Gospodinjski Aparatni D.D., Thales, Teletel Technologia Tilepikoinonionkai Pliroforikis Anonymoi Emporikivimionianiki Etaireia, Alcatel-Lucent Deutschland AG, Etairia Investments PLC, Siemens
Award relations: Enhanced networked environment for personalised provision of AV context and appliances control
Project: Research

COMANCHE: Software configuration management framework for networked services environments and architectures incorporating ambient intelligence features
The main objective of the proposed project is to develop and validate a generic framework for Software Configuration Management (SCM), which will pave the way to the realisation of technically and commercially viable private spaces incorporating ambient intelligence features. For this purpose the project will specify and develop the COMANCHE modular and scalable architecture targeting the provision of consistent, secure, low-cost (low-effort) SCM services across today’s heterogeneous, and multi-vendor environments. The realisation of the COMANCHE SCM services framework will be built on an adequate software engineering and knowledge management infrastructure that the project will deliver. The main components of this infrastructure will be the following. - The COMANCHE Knowledge Management Framework which will provide the means for effectively conceptualising, organizing, discovering, and exploiting the tremendous amounts of (currently unorganised and scattered) attribute information, pertaining to software configuration management. - A modular component-based software architecture and an adequate design methodology and tool, which will effectively address the engineering and run-time management of reconfigurable software for ambient intelligent networked services environments. - A formal modelling methodology and a consistency validation framework for capturing and analysing the structure and run-time behaviour of distributed software systems. This approach will aim to preserve the integrity of the targeted networked services environments in terms of allowing software-configuration error detection and recovery across present complex, and multi-vendor private spaces.

Soler, J., Project Participant, Department of Photonics Engineering
Forsk. EU - Rammeprogram
01/09/2006 → 31/10/2008
Award relations: Software configuration management framework for networked services environments and architectures incorporating ambient intelligence features
Project: Research

FLEXINET: Flexible gateways architecture for enhanced access network services and applications
The main objective of the FlexiNET project is to define and implement a scalable and modular network architecture incorporating adequate network elements (FlexiNET Node Instances) offering cross-connect control, switching/routing control, and advanced services management/access functions at the network access points that currently only support connectivity between user terminals and network core infrastructures. The primary aim is not to replace or enhance existing networking infrastructures, but to offer a value-added complementary network architecture addressing service access de-centralisation and separation of data, service logic and control from the pure transport network. The FlexiNET architecture will be based on the FlexiNET node instances, which will consist of scalable hardware and software platforms on top of which core network functionality will be realized, as a set of distributed sub-systems integrated into a generic services execution environment. The FLEXINET concepts and architecture are applicable to various access network technologies (GSM/GPRS/UMTS, WLANs, V5, etc.), but will be focused on the mobile and wireless operator needs (UMTS and WLAN) for packet switched applications. The basic motivation for this project is to relieve core networks from data handling and signalling procedures overhead, to accelerate the introduction of next-generation marketable services, and increase competitiveness in the telecom field by facilitating the broadening of current business models for services provisioning and exploitation.

Soler, J., Project Participant, Department of Photonics Engineering
Rupp, S., Contact Person, SEL AG
Forsk. EU - Rammeprogram
01/03/2004 → 31/05/2006
Collaborators: Teletel S.A., SEL AG, Vodafone, Apex Concepts and Solutions AG, E-Plus Mobilfunk GmbH and Co. KG, IBM Research, University of Patras, Hitachi Europe SA
Award relations: Flexible gateways architecture for enhanced access network services and applications
Project: Research
GEMINI: Generic Architecture for customised IP-based IN services over hybrid voice over IP and SS7 networks
The project is organised in six workpackages (WP) combining the necessary partners and expertise for assuring successful execution and accurate market orientation: - Initially the Service requirements and GEMINI specifications (WP2) are determined. In this phase the supported IN services (CS-2 and extensions to the CS-2 Service set) required by the end-users are defined, and the technological framework for the system is provided; - Based on the users' expressed requirements, the Development of the PSTN-based IN infrastructure (WP3), will design and develop the main element of the GEMINI architecture; - The IN/SS7 Signalling Gateway, which will allow the use of the IN/PSTN infrastructure already in place. Work will also include the implementation of an extended-CS2 set of services and other details (numbering translation schemes, interfaces with existing VoIP network infrastructure); - The Development of the IP-based IN infrastructure (WP4), aims at the development of the network entities on the IP network side. The main sub-systems developed shall include SSP-IP and the SCP-IP components termed after their SS7 SCN-analogs. Furthermore the advanced environment used for Service Creation and Management in the converged network is being developed; - The Integration and User Trials (WP5), involve the development of a pilot network, integrating the components introduced and providing evidence on the feasibility of the project's results. The user trials shall be performed using the GEMINI platform to allow services' interworking between Partner 1's PSTN network and Partner 1 and/or Partner 6 recently deployed VoIP network; - Finally the Market Assessment / Exploitation and Dissemination (WP6), which extends throughout the project's lifecycle, relates among others to the assessment of market status, the promotion efforts, the potential research publications and the standardization of the project's results.

Soler, J., Project Participant, Department of Photonics Engineering
Grabner, B., Project Manager, Telecom Austria AG
Forsk. EU - Rammeprogram
01/03/2002 → 29/02/2004
Collaborators: SEL AG, Solinet GmbH, Otenet S.A., Telecom Austria AG, Intracom Telecom S.A.
Award relations: Generic Architecture for customised IP-based IN services over hybrid voice over IP and SS7 networks
Project: Research

Activities:

Next Generation PaaS and CORD Cloud-Native Telco services
Period: 4 Dec 2018 → 6 Dec 2018
Angelos Mimidis Kentis (Other)
José Soler (Other)
Ferran Canellas Cruz (Other)
Networks Technology and Service Platforms
Department of Photonics Engineering

Description
Poster and Demo
Degree of recognition: International
Documents:
Poster_ONF Telco PaaS

Related event
ONF Connect
04/12/2018 → 06/12/2018
Santa Clara, United States
Activity: Talks and presentations › Conference presentations

Policy Framework Prototype for ONOS
Period: 4 Dec 2018 → 6 Dec 2018
Angelos Mimidis Kentis (Other)
José Soler (Other)
Ferran Canellas Cruz (Other)
Networks Technology and Service Platforms
Department of Photonics Engineering
Description
Poster and demo presented at ONF Connect 2018 in Santa Clara, California, USA
Degree of recognition: International
Documents:
Poster_ONF Policy Framework_v2_.pptx

Related event
ONF Connect
04/12/2018 → 06/12/2018
Santa Clara, United States
Activity: Talks and presentations › Conference presentations

VIM Adaptation Layer for CORD
Period: 4 Dec 2018 → 6 Dec 2018
Angelos Mimidis Kentis (Other)
José Soler (Other)
Ferran Canellas Cruz (Other)
Networks Technology and Service Platforms
Department of Photonics Engineering

Description
Poster
Degree of recognition: International
Documents:
Poster_ONF VIM Adaptation Layer

Related event
ONF Connect
04/12/2018 → 06/12/2018
Santa Clara, United States
Activity: Talks and presentations › Conference presentations

Science China Information Sciences (Journal)
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related journal
Science China Information Sciences
1674-733x
Scopus rating (2017): CiteScore 1.89 SJR 0.462 SNIP 1.027, Web of Science (2019): Indexed yes
Local database
Activity: Research › Peer review of manuscripts

Conference on Principles, Systems and Applications of IP Telecommunications- IPTCOM18 (Event)
Period: 1 Aug 2018 → 7 Aug 2018
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related event
Conference on Principles, Systems and Applications of IP Telecommunications- IPTCOM18
15/10/2018 → 17/10/2018
Chicago, United States
Activity: Research › Peer review of manuscripts

IEEE Conference on Network Function Virtualization and Software Defined Networks (Event)
Period: 15 Jul 2018 → 3 Aug 2018
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related event

IEEE Conference on Network Function Virtualization and Software Defined Networks
27/11/2018 → 29/11/2018
Verona, Italy
Activity: Research › Peer review of manuscripts

International Journal of Computer & Telecommunication Networking (Journal)
Period: 10 Jul 2018 → 15 Aug 2018
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related journal

International Journal of Computer & Telecommunication Networking
Local database
Activity: Research › Peer review of manuscripts

International Conference on Intelligent Transport Systems Telecommunications - ITST2018 (Event)
Period: 1 Jul 2018 → 15 Jul 2018
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related event

International Conference on Intelligent Transport Systems Telecommunications - ITST2018
15/10/2018 → 17/10/2018
Lisbon, Portugal
Activity: Research › Peer review of manuscripts

Science China Information Sciences (Journal)
Period: 18 May 2018
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

Science China Information Sciences
1674-733x
Scopus rating (2017): CiteScore 1.89 SJR 0.462 SNIP 1.027, Web of Science (2019): Indexed yes
Local database
Activity: Research › Peer review of manuscripts
IEEE 5G World Forum (Event)
Period: 14 May 2018
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related event
IEEE 5G World Forum : Cloud native 5G Workshop
09/07/2018 → 11/07/2018
Sta. Clara, United States
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine (Journal)
Period: 13 May 2018
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
IEEE Communications Magazine - Unlocking 5G spectrum

Related journal
IEEE Communications Magazine
0163-6804
Central database
Activity: Research › Peer review of manuscripts

International Teletraffic Conference 2018 (ITC 30) (Event)
Period: 2 May 2018
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related event
International Teletraffic Conference 2018 (ITC 30)
03/09/2018 → 07/09/2018
Vienna, Austria
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine (Journal)
Period: 17 Apr 2018
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Review of Manuscript

Related journal
Member of Evaluation Tribunal - PhD Thesis  
**Period:** 15 Nov 2017 → 25 Jan 2018  
José Soler (External examiner)  
Department of Photonics Engineering  
Networks Technology and Service Platforms  

**Description**  
Vasque Country University (EHU)  
PhD Thesis: "Moving toward the intra protocol de-osification of TCP in mobile networks: start-up and mobulity", by Eneko Atxutegui  
Degree of recognition: International  
Activity: Examinations and supervision › External examination  

Networks: from physical entities to software processes in virtual environments  
**Period:** 14 Jul 2017  
José Soler (Speaker)  
Department of Photonics Engineering  
Networks Technology and Service Platforms  

**Description**  
Invited lecture at the postgraduate lectures session in the Computer Science Faculty at Complutense University of Madrid. Networks: from physical entities to software processes in virtual environments  

**Related event**  
Networks: from physical entities to software processes in virtual environments: Invited lecture at the Postgraduate lectures session.  
14/07/2017 → 14/07/2017  
Madrid, Spain  
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities  

IEEE Globecom (Publisher)  
**Period:** 1 May 2017  
José Soler (Reviewer)  
Department of Photonics Engineering  
Networks Technology and Service Platforms  

**Description**  
http://globecom2017.ieee-globecom.org/  
Degree of recognition: International  
Links:  
http://globecom2017.ieee-globecom.org/  

**Related Publisher**  
IEEE Globecom  
Local database  
Activity: Research › Peer review of manuscripts  

Member of Evaluation Tribunal. (Event)  
**Period:** 1 May 2017 → 16 Sep 2017
José Soler (Chairman)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Degree of recognition: International

Related event
Member of Evaluation Tribunal. : PhD Thesis
15/03/2017 → 15/07/2017
Madrid, Spain
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

Dansk Universitetspaedagogisk Tidsskrift (Journal)
Period: 1 Apr 2017 → 7 Apr 2017
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
Dansk Universitetspaedagogisk Tidsskrift
1901-5089
BFI (2019): BFI-level 1
Indexed in DOAJ
Central database
Activity: Research › Peer review of manuscripts

Journal of Intelligent Transportation Systems (Journal)
Period: 1 Apr 2017 → 7 Apr 2017
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
Journal of Intelligent Transportation Systems
1547-2450
ISI indexed (2013): ISI indexed yes
Central database
Activity: Research › Peer review of manuscripts

Member of Evaluation Tribunal. (Event)
Period: 15 Mar 2017 → 15 Jul 2017
José Soler (Participant)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Madrid Complutense University.

Related event
Member of Evaluation Tribunal. : PhD Thesis
15/03/2017 → 15/07/2017
Madrid, Spain
Activity: Membership › Membership in review committee

IEEE Transactions on Dependable and Secure Computing (Journal)
Period: 10 Mar 2017 → 20 Mar 2017
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Peer Review

Related journal
IEEE Transactions on Dependable and Secure Computing
1545-5971
BFI (2019): BFI-level 2, Scopus rating (2017): CiteScore 4.43 SJR 0.802 SNIP 2.559, Web of Science (2019): Indexed yes
Central database
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine (Journal)
Period: 1 Mar 2017 → 14 Mar 2017
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Peer Review. (Network Testing and Analytics Series)

Related journal
IEEE Communications Magazine
0163-6804
Central database
Activity: Research › Peer review of manuscripts

Journal of Intelligent Transportation Systems (Journal)
Period: 1 Mar 2017 → 30 Mar 2017
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related journal
Journal of Intelligent Transportation Systems
1547-2450
Central database
Activity: Research › Peer review of manuscripts

European Conference on Networks & Communications (EuCNC 2017) (Publisher)
Period: 1 Feb 2017 → 20 Feb 2017
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

**Description**
Peer Review

**Related Publisher**

*European Conference on Networks & Communications (EuCNC 2017)*
Local database
Activity: Research › Peer review of manuscripts

---

*IET Communications Journal (Journal)*
Period: 1 Dec 2016 → 19 Dec 2016
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

**Description**
http://digital-library.theiet.org/content/journals/iet-com

**Related journal**

*IET Communications Journal*
Local database
Activity: Research › Peer review of manuscripts

---

*IEEE Communication Magazine - Automotive Networking Series (Journal)*
Period: 1 Sep 2016 → 20 Sep 2016
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

**Related journal**

*IEEE Communication Magazine - Automotive Networking Series*
Local database
Activity: Research › Peer review of manuscripts

---

*IEEE Communications Magazine - Automotive Networking Series (Journal)*
Period: 1 Jul 2016 → 14 Jul 2016
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

**Related journal**

*IEEE Communications Magazine - Automotive Networking Series*
Local database
Activity: Research › Peer review of manuscripts

---

*European Conference on Networks and Communications (Journal)*
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

European Conference on Networks and Communications
Local database
Activity: Research › Peer review of manuscripts

IEEE Transactions on Vehicular Technology (Journal)
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

IEEE Transactions on Vehicular Technology
Local database
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine - Automotive Networking Series (Journal)
Period: 20 Nov 2015 → 22 Nov 2015
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

IEEE Communications Magazine - Automotive Networking Series
Local database
Activity: Research › Peer review of manuscripts

European Journal of Engineering Education (Journal)
Period: 5 Nov 2015 → 17 Nov 2015
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

European Journal of Engineering Education
0304-3797
BFI (2019): BFI-level 2, Scopus rating (2017): CiteScore 1.59 SJR 0.581 SNIP 1.795, ISI indexed (2013): ISI indexed no,
Web of Science (2019): Indexed yes
Central database
Activity: Research › Peer review of manuscripts

2nd IEEE Conference on Network Softwarization (NetSoft 2016) (Journal)
Period: 1 Nov 2015 → 16 Nov 2015
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

2nd IEEE Conference on Network Softwarization (NetSoft 2016)
Local database
International Conference on Consumer Electronics- IEEE ICCE 2015 (Journal)
Period: 22 May 2015
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
International Conference on Consumer Electronics- IEEE ICCE 2015
Local database
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine - Future Railway Communications (Journal)
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Communications Magazine - Future Railway Communications
Local database
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine - Optical Communication Series (Journal)
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Communications Magazine - Optical Communication Series
Local database
Activity: Research › Peer review of manuscripts

European Conference on Networks and Communications (EUCNC2015) (Journal)
Period: 16 Mar 2015
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
European Conference on Networks and Communications (EUCNC2015)
Local database
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine (Journal)
Period: 16 Mar 2015
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

IEEE Communications Magazine
0163-6804
Central database
Activity: Research › Peer review of manuscripts

Journal of Mathematical problems in Engineering (Journal)
Period: 1 Jan 2015
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Links:
http://www.hindawi.com/journals/mpe/

Related journal

Journal of Mathematical problems in Engineering
Local database
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine (Journal)
Period: 8 Dec 2014 → 15 Dec 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

IEEE Communications Magazine
0163-6804
Central database
Activity: Research › Peer review of manuscripts

IEEE International Conference on Communications ICC15 (Journal)
Period: 1 Nov 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

IEEE International Conference on Communications ICC15
Local database
Activity: Research › Peer review of manuscripts

WCNC2015 - IEEE Wireless Communications & Networking Conference (Journal)
Period: 20 Oct 2014 → 1 Nov 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

WCNC2015 - IEEE Wireless Communications & Networking Conference
Local database
Activity: Research › Peer review of manuscripts

Related journal

International Journal of Parallel, Emergent and Distributed Systems (Journal)
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

International Journal of Parallel, Emergent and Distributed Systems (Journal)
Local database
Activity: Research › Peer review of manuscripts

International Conference on Electrical, Electronics and Systems Engineering - ICEESE2014 (Journal)
Period: 9 Oct 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

International Conference on Electrical, Electronics and Systems Engineering - ICEESE2014 (Journal)
Local database
Activity: Research › Peer review of manuscripts

International Conference on Connected Vehicles & Expo ICCVE 2014 (Journal)
Period: 8 Aug 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Links:
http://www.iccve.org/

International Conference on Connected Vehicles & Expo ICCVE 2014 (Journal)
Local database
Activity: Research › Peer review of manuscripts

IEEE Networks Magazine - Open Call Article (Journal)
Period: 8 Apr 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

IEEE Networks Magazine - Open Call Article (Journal)
Local database
3rd IEEE International Conference on Consumer Electronics - IEEE ICCE 2014 (Journal)
Period: 5 Apr 2014 → 6 Apr 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
3rd IEEE International Conference on Consumer Electronics - IEEE ICCE 2014
Local database
Activity: Research › Peer review of manuscripts

Dansk universitetspædagogisk Tidsskrift (Journal)
Period: 11 Mar 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Dansk Universitetspædagogisk Tidsskrift

Related journal
Dansk universitetspædagogisk Tidsskrift
1901-5089
BFI (2019): BFI-level 1
Indexed in DOAJ
Central database
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine - Design & Implementation Series (Journal)
Period: 20 Feb 2014 → 11 Mar 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Communications Magazine - Design & Implementation Series
Local database
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine - AdHoc & Sensor Network Series (Journal)
Period: 15 Feb 2014 → 10 Mar 2014
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Communications Magazine - AdHoc & Sensor Network Series
Local database
Activity: Research › Peer review of manuscripts
COST ICT 1304 ACROSS Kick-Off meeting: Autonomous Control for a Reliable Internet of Services (ACROSS)
Period: 14 Nov 2013
José Soler (Participant)

Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Representative of Denmark in Management Comittee, on behalf of DTU
Links:
http://www.cost.eu/domains_actions/ict/Actions/IC1304
Activity: Other

Lecture on PBL-based course didactics and methodology: "To Plan teaching - to stage learning"
Period: 29 Oct 2013
José Soler (Speaker)

Department of Photonics Engineering
Networks Technology and Service Platforms

Description
As part of UP - Pedagogical training for experienced university teachers.

Schæffergården Gentofte

Related external organisation
Learning Lab DTU
Gentofte, Denmark
Activity: Other

IEEE Wireless Communication & Networking Conference (WCNC 2014) (Journal)
José Soler (Reviewer)

Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Wireless Communication & Networking Conference (WCNC 2014)
Local database
Activity: Research › Peer review of manuscripts

2013 International Conference on Connected Vehicles & Expo (Journal)
Period: 1 Oct 2013 → 31 Oct 2013
José Soler (Reviewer)

Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
2013 International Conference on Connected Vehicles & Expo
Local database
Activity: Research › Peer review of manuscripts

IEEE Network Magazine (Journal)
Period: 15 Aug 2013 → 5 Sep 2013
José Soler (Reviewer)
INDIN 2013 Tutorial: Demonstration of an Open Source framework for Embedded Systems Verification and Simulation (EU FP7 MODUS Project)
Period: 29 Jul 2013
José Soler (Speaker)

Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Synopsis - The tutorial will serve as an introductory session to the developments made in the EU FP7 Project MODUS (Methodology and supporting tool set advancing embedded systems quality, http://www.modus-fp7.eu/ ) with the objective of enabling small and medium size enterprises (SMEs) to incorporate advanced embedded system development procedures with reduced costs.

The MODUS Project focus on four differentiated processes applicable to embedded systems development:

- Formal Verification and Validation (FVV): allows testing a system model against a set of constraints, assuring consistency and security of operation against an initial specification.
- Hardware and Software co-simulation (HSCS): allows simulating together software and hardware parts of a system, with the objective of design optimisation, early bugs detection, and shorter development life-cycle.
- Performance Optimization (PO): enables the application of different types of optimisations for the generated source code, from a formal description model of the embedded system software.
- Customizable Source-code Generation (CSCG): allows the customisable model-driven source code generation, according to specific coding conventions/standards with respect to formal representations. The tutorial will introduce some applications of each of the previous four differentiated processes and finally it will illustrate them with examples, using the open source tools developed within the MODUS project, demonstrating the usability of the developed integrated environment and its applicability:
  * FVV: Based on an initial model of the system under test, the MODUS toolset integrates different formal model verification (FMV) tools, as well as the corresponding model format translators: XMI, Promela, RSL, SPIN and RAISE-SAL. Several examples will be provided demonstrating the applicability of FMV techniques to embedded systems development.
  * HSCS: on a model of the HW part of the system under test, the MODUS toolset generates a SystemC/TLM2.0 skeleton virtual platform of the system. This virtual platform has to be filled with SystemC behavioural models of components and compiled. The MODUS user is then free to run its software on this virtual platform and collect information from simulations.
  * PO: Based on an initial model of the system under test and user configurations, different code generation strategies are applied for the generation of an optimised source code in terms of code execution, memory usage, safety precaution etc.
  * CSCG: Based on the different user configurations on the target source code, programming language and a set of coding conventions and standards rules (e.g. MISRA, ESA) for embedded systems software development, several use cases could be provided demonstrating the improvement in software readability and lifetime maintenance.

The tutorial is assumed to be demonstrative and didactic, therefore the audience level target, as requested, is basic - medium.

2 hours tutorial held during INDIn 2013 Conference, highlighting background, purpose and developed open source tools, within the EU FP7 MODUS Project. Co responsible for the tutorial together with Hao Yu, also from DTU Fotonik
Related journal

**19th IEEE International Conference on Networks (ICON 2013)**
Local database
Activity: Research › Peer review of manuscripts

*International Conference on Principles, Systems and Applications of IP Telecommunications (IPTComm 2013) (Journal)*
Period: 20 Jul 2013 → 24 Jul 2013
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

**International Conference on Principles, Systems and Applications of IP Telecommunications (IPTComm 2013)**
Local database
Activity: Research › Peer review of manuscripts

**IEEE 3rd International Conference on Consumer Electronics (Journal)**
Period: 15 May 2013 → 31 May 2013
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

**IEEE 3rd International Conference on Consumer Electronics**
Local database
Activity: Research › Peer review of manuscripts

**2013 IEEE Symposium on Industrial Electronics and Applications (Journal)**
Period: 10 May 2013 → 25 May 2013
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

**2013 IEEE Symposium on Industrial Electronics and Applications**
Local database
Activity: Research › Peer review of manuscripts

**5th International Conference on Advances in Future Internet (AFIN 2013) (Journal)**
Period: 25 Apr 2013 → 8 May 2013
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

**5th International Conference on Advances in Future Internet (AFIN 2013)**
Local database
Activity: Research › Peer review of manuscripts
IEEE Communications Magazine - Smart Cities Special Issue (June 2013) (Journal)
Period: 15 Feb 2013 → 22 Feb 2013
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Communications Magazine - Smart Cities Special Issue (June 2013)
Local database
Activity: Research › Peer review of manuscripts

IEEE International Conference on Communications 2013 - Workshop on Smart Communication Protocols and Algorithms. (Journal)
Period: 10 Feb 2013 → 20 Feb 2013
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE International Conference on Communications 2013 - Workshop on Smart Communication Protocols and Algorithms. Local database
Activity: Research › Peer review of manuscripts

International Journal of Computer & Telecommunication Networking (Journal)
Period: 1 Jan 2013 → 23 Jan 2013
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
International Journal of Computer & Telecommunication Networking Local database
Activity: Research › Peer review of manuscripts

IEEE Business Engineering and Industrial Applications Colloquium 2013 (IEEE BEIAC 2013) (External organisation)
Period: 12 Dec 2012
José Soler (Member)
Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related external organisation
IEEE Business Engineering and Industrial Applications Colloquium 2013 (IEEE BEIAC 2013)
Activity: Membership › Membership in review committee

9th International Conference on Networking and Services
Period: 11 Dec 2012
José Soler (Organizer)
Department of Photonics Engineering
Related event

9th International Conference on Networking and Services
24/03/2013 → 29/03/2013
Lisbon, Portugal
Activity: Attending an event › Participating in or organising a conference

IEEE International Conference on Communication 2013 - Technical Symposium on Communication Software and Services (CSS) (External organisation)
Period: 10 Dec 2012
José Soler (Member)

Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related external organisation

IEEE International Conference on Communication 2013 - Technical Symposium on Communication Software and Services (CSS)
Activity: Membership › Membership in review committee

Journal of Ambient Intelligence and Smart Environment (Journal)
Period: 30 Nov 2012
José Soler (Reviewer)

Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related journal

Journal of Ambient Intelligence and Smart Environment
Scopus rating (2017): CiteScore 0.98 SJR 0.218 SNIP 0.562, Web of Science (2019): Indexed yes
Local database
Activity: Research › Peer review of manuscripts

International Journal On Advances in Internet Technology (Journal)
Period: 10 Nov 2012
José Soler (Reviewer)

Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related journal

International Journal On Advances in Internet Technology
Local database
Activity: Research › Peer review of manuscripts

Open Journal On Adhoc & Wireless Sensor Networks (External organisation)
Period: 2 Nov 2012
José Soler (Member)

Department of Photonics Engineering
Networks Technology and Service Platforms
Description
Reviewer
Degree of recognition: International

Related external organisation

Open Journal on Adhoc & Wireless Sensor Networks
Activity: Membership › Membership in review committee

PhD Evaluation: P.R. da Nova Valente, "Action Coordination and resource Allocation Against User Profiles"
Period: 15 Aug 2012
José Soler (External examiner)
Department of Photonics Engineering
Networks Technology and Service Platforms
Activity: Examinations and supervision › External examination

PhD Evaluation: S. Hossain, "Cognitive Support using BDI Agent and Adaptive User Modelling"
Period: 15 Aug 2012
José Soler (External examiner)
Department of Photonics Engineering
Networks Technology and Service Platforms
Activity: Examinations and supervision › External examination

IEEE 18th International Conference on Networks (ICON 2012) (External organisation)
José Soler (Participant)
Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related external organisation

IEEE 18th International Conference on Networks (ICON 2012)
Activity: Membership › Membership in review committee

IEEE Communications Magazine - January 2013 - "Ultimate Technologies & Advances for Future Smart Grid" (Journal)
Period: 1 Jul 2012 → 15 Jul 2012
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal

IEEE Communications Magazine - January 2013 - "Ultimate Technologies & Advances for Future Smart Grid"
Local database
Activity: Research › Peer review of manuscripts

Federated Conference on Computer Science and Information Systems (FedCSIS 2012) (External organisation)
Period: 25 May 2012 → 8 Jun 2012
José Soler (Member)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Reviewer
Degree of recognition: International

Related external organisation

Federated Conference on Computer Science and Information Systems (FedCSIS 2012)
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

International Journal On Advances in Internet Technology (Journal)
Period: 1 May 2012 → 31 May 2012
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Degree of recognition: International

Related journal

International Journal On Advances in Internet Technology
1942-2652
Local database
Activity: Research › Peer review of manuscripts

Korean Information Technology Convergence Society (KITCS) (External organisation)
Period: 1 May 2012 → 15 May 2012
José Soler (Member)
Department of Photonics Engineering
Networks Technology and Service Platforms
Description
International Workshop on Technologies and Applications for Cyber Physical Systems: TACPS-12
PC Member & Reviewer

Related external organisation

Korean Information Technology Convergence Society (KITCS)
Gwangju, Korea, Republic of
Activity: Membership › Board duties in companies, associations, or public organisations

2012 IEEE International Conference on Consumer Electronics (Event)
Period: 20 Apr 2012 → 25 May 2012
José Soler (Member)
Department of Photonics Engineering
Networks Technology and Service Platforms
Description
Reviewer
Degree of recognition: International

Related event

2012 IEEE International Conference on Consumer Electronics
13/01/2012 → 16/01/2012
Las Vegas, United States
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

The fourth International Conference on Advances in Future Internet (Event)
Period: 15 Apr 2012 → 15 May 2012
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
4th International Conference on Advances in Future Internet: AFIN 2012

TPC Member & Reviewer
Degree of recognition: International

Related event
The fourth International Conference on Advances in Future Internet
19/08/2012 → 24/08/2012
Rome, Italy
Activity: Research › Peer review of manuscripts

Om MPLS Teknologi, oplysninger og beslutningsgrundlag
Period: 28 Feb 2012 → 31 Mar 2027
José Soler (Consultant)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Myndighedsbetjening. Rekvireret Arbejde
Rådgivning

Related external organisation
Rigspolitiet - SINE
København, Denmark
Activity: Public and private sector consultancy › Public sector consultancy

IEEE Communications Magazine : Consumer Communications and Networking Series (Journal)
Period: 1 Feb 2012 → 13 Feb 2012
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Communications Magazine : Consumer Communications and Networking Series
Local database
Activity: Research › Peer review of manuscripts

International Workshop on Communication Technologies Support to the Smart Grid ( ICNC'12 - SGCom)
Period: 30 Jan 2012
José Soler (Chairman)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related event
International Workshop on Communication Technologies Support to the Smart Grid ( ICNC'12 - SGCom)
30/01/2012 → 30/01/2012
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.
8th International Conference on Networking & Services (ICNS 2012) (Journal)
Period: 19 Dec 2011 → 20 Dec 2011
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
8th International Conference on Networking & Services (ICNS 2012)
Local database
Activity: Research › Peer review of manuscripts

3rd International Congress on Engineering Education (ICEED)
Period: 8 Dec 2011
José Soler (Chairman)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Session Chair (Education in other sciences)

Related event
3rd International Congress on Engineering Education (ICEED)
07/12/2011 → 08/12/2011
Kuala Lumpur, Malaysia
Activity: Attending an event › Participating in or organising a conference

IEEE Wireless Communications & Networking Conference: Mobile & Wireless Track (WCNC 2012) (Journal)
Period: 1 Nov 2011 → 15 Nov 2011
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Wireless Communications & Networking Conference: Mobile & Wireless Track (WCNC 2012)
Local database
Activity: Research › Peer review of manuscripts

IEEE International Conference on Communications 2012: Communication Software Services and Multimedia Applications Symposium (ICC 2012 - CSS&MAS) (Journal)
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE International Conference on Communications 2012: Communication Software Services and Multimedia Applications Symposium (ICC 2012 - CSS&MAS)
Local database
Activity: Research › Peer review of manuscripts

IEEE Communications Magazine: Communication Protocols and Algorithms for the Smart Grid (COMMAG); May 2012 (Journal)
Period: 30 Aug 2011 → 14 Sep 2011
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Communications Magazine : Communication Protocols and Algorithms for the Smart Grid (COMMAG); May 2012
Local database
Activity: Research › Peer review of manuscripts

IEEE Transactions on Vehicular Technology (Journal)
Period: 1 Jul 2011 → 2 Aug 2011
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE Transactions on Vehicular Technology
Local database
Activity: Research › Peer review of manuscripts

IEEE International Conference on Consumer Electronics (Journal)
Period: 1 Jun 2011 → 15 Jul 2011
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IEEE International Conference on Consumer Electronics
Local database
Activity: Research › Peer review of manuscripts

TPC member at 3rd International Conference in Advances in Future Internet (AFIN 2011) (Journal)
Period: 26 Apr 2011 → 2 May 2011
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
TPC member at 3rd International Conference in Advances in Future Internet (AFIN 2011)
Local database
Activity: Research › Peer review of manuscripts

Journal of Communications : Special Issue on IP Communication Services - TPC Member (JCM-IPComm); ISSN 1796-2021_Q32011 (Journal)
Period: 15 Jan 2011 → 15 Feb 2011
José Soler (Reviewer)
Department of Photonics Engineering
Links:
http://www.academypublisher.com/jcm/si/jcmsi_ipcsc.html (PUB-QA)

Related journal
IEEE GCC Conference 2011: Sustainable Ubiquitous Technology - TPC Member (Journal)
Period: 1 Nov 2010 → 22 Nov 2010
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms
Links:
http://www.ieeegcc.org/gcc/technical-committee.html (PUB-OA)

Related journal
IEEE GCC Conference 2011: Sustainable Ubiquitous Technology - TPC Member
Local database
Activity: Research › Peer review of manuscripts

Korean Advanced Institute of Science and Technology (KAIST)
Period: 1 Oct 2010
José Soler (Visiting researcher)
Department of Photonics Engineering
Networks Technology and Service Platforms

Description
Official visit DTU KAIST (South Korea)
Activity: Visiting an external institution › Visiting another research institution

Trafikstyrelsen: Regarding development possibilities of GSM-R
Period: 3 Jun 2010
José Soler (Speaker)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related external organisation
Unknown external organisation
Activity: Talks and presentations › Conference presentations

IPTComm10: TPC Member (Journal)
Period: 1 May 2010 → 31 May 2010
José Soler (Reviewer)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related journal
IPTComm10: TPC Member
Local database
Activity: Research › Peer review of manuscripts

Trafikstyrelsen: Descriptive part of analysis of development possibilities for GSM-R
Period: 1 Apr 2010 → 31 May 2010
José Soler (Participant)
Banebranchen: Regarding DTU-Fotonik's contribution possibilities to research initiatives for the train industry.
Period: 20 Jan 2010
José Soler (Speaker)
Department of Photonics Engineering
Networks Technology and Service Platforms

Related external organisation

**Unknown external organisation**
Activity: Talks and presentations › Conference presentations

DTU's departments collaboration towards research initiatives for railway infrastructures and green transport: Myndighedsbetjening & Strategiske Forskningsråd
Period: 1 Jan 2010 → 31 Dec 2010
José Soler (Participant)
Department of Photonics Engineering
Networks Technology and Service Platforms
Activity: Other

Press clippings:

**EU-krav tvinger 20 år gammel teknologi ind i danske tog**
José Soler
06/06/2015

Subject
GSM-R, ERTMS
Department of Photonics Engineering, Networks Technology and Service Platforms

Media contribution (1)

**EU-krav tvinger 20 år gammel teknologi ind i danske tog**
06/06/2015
Ingeniøren, Print
José Soler
Department of Photonics Engineering, Networks Technology and Service Platforms
Press/Media: Press / Media

**EU-krav tvinger 20 år gammel teknologi ind i danske tog**
José Soler
06/06/2015

Subject
GSM-R, ERTMS, Banedanmarks Signal Program
Department of Photonics Engineering, Networks Technology and Service Platforms

Media contribution (1)

**EU-krav tvinger 20 år gammel teknologi ind i danske tog**
06/06/2015
Ingeniøren, Web
http://ing.dk/artikel/eu-krav-tvinger-20-aar-gammel-teknologi-ind-i-danske-tog-176590
José Soler
Department of Photonics Engineering, Networks Technology and Service Platforms
Relations
Research outputs:
Impact of the traffic load on performance of an alternative LTE railway communication network
Capacity gain with an alternative LTE railway communication network
LTE Micro-cell Deployment for High-Density Railway Areas
LTE for Railways: Impact on Performance of ETCS Railway Signaling
VoLTE performance in railway scenarios
Communication Technologies Support to Railway Infrastructure and Operations
Communication Technologies for Vehicles
VoLTE Performance in Railway Scenarios
Press/Media: Press / Media