Wrap-up Session

Summary of the fourth Kaleidoscope conference
(panel with session chairs)

Wrap-up Session
Chair: Kai Jakobs
TPC Chair, Kaleidoscope 2011
RWTH Aachen University, Germany

ITU Kaleidoscope 2011

The fully networked human?

Innovations for future networks and services

1. The Role Of ICTs In Quantifying The Severity and Duration Of Climatic Variations - Kenya's Case/**Muthoni Masinde** (University of Cape Town, South Africa)

2. ICT use in South African Microenterprises: An assessment of Livelihood outcomes/**Wallace Chigona** (University of Cape Town, South Africa)

3. SM2: Solar Monitoring System in Malawi/**Antoine Bagula** (University of Cape Town, South Africa)

Session 1 - ICTs helping Africa

Chair: Alfredo Terzoli

Rhodes University

South Africa

The Role of ICTs in Quantifying the Severity and Duration of Climatic Variations - Kenya's Case

- "This paper is part of a larger project whose objective is develop '**homegrown**' Early Warning System (EWS) for climatic variations. The system makes uses of **Intelligent Agents to bring together IK, scientific weather forecasts, Wireless Sensor Networks (WSNs) and mobile phones**."

ICT use in South African Microenterprises: An assessment of Livelihood outcomes

- What role do ICTs play in the livelihood of microenterprises?
  - What kind of ICTs do they use? **Not much use**
  - What affects their use of ICTs? **Cost, competence**
- What impact do the ICTs have on the businessWhat is the impact of business-supporting organisations in the use and impact of ICTs of Microenterprises

Not great

SM2: Solar Monitoring System in Malawi

- Developed a cost effective wireless based remote monitoring system that continuously presents remote energy yields and performance measures
- Test bed setup at
  - Malavi Primary School in Chiradzulo
    - Solar PV Electrical system
  - Malawi Polytechnic
    - Central management system

Conclusions/Recommendations

- Evidence of a positive trend among ICT practioners from Africa to solve directly their most pressing problems.

- ICT services that respond to needs in Africa should be developed as a matter of urgency.

1. Proposal of a Wired Rural Area Network with Optical Submarine Cables/**Yoshitoshi Murata** (Iwate Prefectural University, Japan)
2. Development of an ICT road map for eServices in rural areas/ **Mamello Thinyane** (Telkom Centre of Excellence in ICTD, South Africa)
3. Investigating implementation of communication networks for advanced metering infrastructure in South Africa/**Monontši Nthontho** (University of Cape Town, South Africa)

Session 2 - Connecting rural regions
C**hair:** Ajay Ranjan Mishra
NSN – India

Highlights from Paper 1 Proposal of A Wired Rural Area Network with Optical Submarine Cables

- Focus: To introduce future networks (optical) in rural areas, Research is around a small cluster of houses/ village e.g. around 15 houses
- Low cost network structure is proposed that uses optical submarine cables; testing was done with respect to throughput and transmission delay (existing wireless system not suited)
- Proposed the OSC-RAN to reduce the total cost by getting residents and some helper to establish and maintain networks by themselves (trial confirmed that networks be mainted by local help)

Highlights from Paper 2
DEVELOPMENT OF AN ICT ROAD MAP FOR E-SERVICES IN RURAL AREAS

- Provides a high-level blueprint / reference model for ICTD initiatives
- Identifies, Analyses and Selects appropriate technology to achieve ICTD goals
- Highlights the technical and business models applicable for rural communities;

Highlights from Paper 3 Investigating Implementation of Communication Networks for Advanced Metering Infrastructure (AMI) in South Africa

- Incorporating advanced IT, communication networks, sensors and smart meters to a power network
- AMI network design considerations with focus on network utilization

Conclusions/Recommendations

- Paper 1: It is recommended to see if this proposal could be implemented in countries that have real rural populations, and also see the viability against the other rural connectivity solutions that are wireless based or may be a combination of both wireless & wireline systems
- Paper 2: A technology roadmap is indeed a requirement for countries like South Africa. Infact, joint study with ITU would be recommended so that other countries with similar economies could be benefitted with such as study

Conclusions/Recommendations

- Paper 3: Deeper study is required in this area as the fact of the day is that energy management is much more needed than anticipated esp since the author is proposing that AMI will not be changing the bandwidth figures dramatically.

ITU Kaleidoscope 2011

The fully networked human?

Innovations for future networks and services

1. Invited Paper: Cooperative Wi-Fi-Sharing: Encouraging Fair Play/**Hanno Wirtz** (RWTH Aachen University, Germany)
2. Making things socialize in the Internet -- Does it help our lives?/**Luigi Atzori** (University of Cagliari, Italy)
3. Net-Centric World: Lifestyle of the 21st Century/**Daniel Kharitonov** (Juniper Networks Inc, USA)
4. Reflexive Standardization of Network Technology/**Ian Graham** (University of Edinburgh, United Kingdom)

Session 3 - Reflections on a fully networked society

Chair: Yoshikazu Ikeda

Otani University, Japan

Cape Town, South Africa
12–14 December 2011

Highlights from Paper 1 "Invited Paper: Cooperative Wi-Fi Sharing: Encouraging Fair Play"

- Wi-Fi Sharing as an alternative
  - Cost-efficient, Pervasive
- Incentive to contribute
  - **Reciprocity**, + Basic incentive
- Incentive to behave
  - Against: Misuse of shared resources, Missing perception, Non-Repudiation
  - Centralized control, Decentralized control
- Corporation by Contract; by Law
- Framework & Standardization needed

Highlights from Paper 2 "Making things socialize in the Internet -- Does it help our lives?"

- **Social** Internet of Things (SIoT)
- Expected numbers of objects: trillions
  - Advantages:**Navigable**, Scalable, Trustworthy
- **Relationship** Models for SIoT
  - Communal sharing, Equality sharing, Authority ranking, Market pricing
- Applications > Components > Architecture
  - Simulations
- Needs "object open social" standards
  - Software, Key use-cases, Experiments

Highlights from Paper 3 "Net-Centric World: Lifestyle of the 21st Century"

- Commute-Centric vs. Net-Centric World
  - The center of human activity is not a physical place but **network**
- Net-Centric Factor and its economy basics are proposed
  - Network is a **catalyst for change**
  - Telecommuting
- IPsphere framework (IPSF)
  - New network programmability defined
- ICT industry remains at forefront of development

Highlights from Paper 4 "Reflexive Standardization of Network Technology"

- Case study of IoT (Internet of Things) standardization:
  - ISO IEC JCT1 SC31 WG6
- Emergence of new standardization
- **Reflexive cosmopolitan** process
  - Because of technology development driven, collectively choose a standardization home, open process
  - To avoid platform wars
  - Late modern standard development

Conclusions/Recommendations

- Fully networked society is about to realized
- Network-Centric World may change way of life, work and socioeconomic system
- Social IoT: Emerging information infrastructure for every human and thing
- Interdisciplinary development needed between technology and social study
- Reflexive cosmopolitan standardization becomes achievable for IoT

1. Radio Resource Management in OFDMA-CRN Considering Primary User Activity and Detection Scenario/**Dhananjay Kumar** (Anna University, India), **Kanagaraj Nachimuthu Nallasamy** (Alcatel-Lucent India Limited, India)
2. Optimal Pilot Patterns Considering Optimal Power Loading for Cognitive Radios in the Two Dimensional Scenario/**Boyan Soubachov** (University of Cape Town, South Africa)
3. Optimal Spectrum Hole Selection and Exploitation in Cognitive Radio Networks/**Mahdi Pirmoradian** (Kingston University London, United Kingdom)

Session 4 - Frequency and Spectrum Management
Chair: Mitsuji Matsumoto
Waseda University, Japan

Session 4 - Frequency and Spectrum Management (as Cognitive Radio)

Chair: Mitsuji Matsumoto
Waseda University, Japan

The cognitive wireless system is an advanced wireless communications networks that can provide mechanisms for more efficient use of the spectrum through dynamic spectrum access techniques.

In order to solve this issue, the detection of the surrounding wireless network using "Time", "Frequency" , "Space" parameters is important. Recently OFDMA technology is discussed.

In this session, Sub-carrier and Power Allocation (SPA) Algorithm for OFDMA-CRN, A naïve 2-dimensional optimization, Optimal Spectrum Hole Selection & Exploitation were discussed.

Highlights from Paper 1 "Radio Resource Management in OFDMA-CRN Considering Primary User Activities and Detection Scenario"

- Analyzed the spectrum availability
- Defined the objective function and optimized it analytically.
- Developed Sub-carrier and Power Allocation (SPA) Algorithm for OFDMA-CRN.
- Analysis & simulation of the effect of both issues i.e. primary user activity and detection.

Highlights from Paper 2 "Optimal Pilot Patterns Considering Optimal Power Loading for Cognitive Radios in the Two Dimensional Scenario"

- An inter-dependence was identified where optimal power loading needs to be considered for optimal pilot patterns
- A naïve 2-dimensional optimization problem was proposed and simulated
- It was found that the new optimal pilot placements are drastically different
- Power loading & pilot pattern algorithms will need to be implemented & standardized.

Highlights from Paper 3 "Optimal Spectrum Hole Selection and Exploitation in Cognitive Radio Networks"

- Two spectrum opportunity schemes namely MRLT(*Maximum Residual Lifetime Technique)* and MCT(*Minimum Collision Technique)* were proposed.
- It can be seen that MRLT scheme improves spectrum utilization in comparison with MCT.
- Adaption delay and real sensing delay and sensing time need to be considered.
- Cooperative spectrum selection scenario in coexistence networks.

Conclusions/Recommendations

- In this session, the new and interesting topics on the dynamic frequency allocation technologies were discussed.
- 9 questions were discussed. In particular, Standardization aspects in ITU-(T and R) were focused. i.e., detection of PU, delay time, collision and interference of the subcarrier transmission, energy optimization, how to allocate the new spectrum, realization method, etc.
- Contributions to current ITU-R documents were requested.

1. Transmission Analysis of Digital TV Signals over a Radio-on-FSO Channel/ **Chedlia Ben Naila** (Waseda University, Japan)
2. A Hybrid MAC with Intelligent Sleep Scheduling for Wireless Sensor Networks/**Mohammad Arifuzzaman** (Waseda University, Japan)
3. Route Optimization Based On The Detection of Triangle Inequality Violations/**Papa Ousmane Sangharé** (Université Cheikh Anta Diop de Dakar, Senegal)

Session 5 - Optimisation of Layers 1 – 3
Chair: Tohru Asami
University of Tokyo, Japan

Highlights from Paper 1

"Transmission Analysis of Digital TV Signals over a Radio-on-FSO Channel"

- Shows an experiment of Radio frequency on free-space optical (RoFSO) system
  - To transmit the Japanese integrated services digital broadcasting terrestrial(ISDB-T) signals over 1km link
- Results
  - Without severe atmospheric turbulence, a properly engineered RoFSO link can effectively transmit OFDM based digital TV signals
  - Got performance metric parameters to evaluate ISDB-T transmission using RoFSO links such as CNIR, BER and MER

Highlights from Paper 2

"A Hybrid MAC with Intelligent Sleep Scheduling for Wireless Sensor Networks"

- Propose medium access control protocol (IH-MAC) for WSNs
  - Using the strength of CSMA and TDMA
  - Depending on the network loads the IH-MAC protocol dynamically switches from broadcast scheduling to link scheduling and vice- versa
  - Used Request-To-Send (RTS), Clear–To-send (CTS) handshakes with methods for adapting the transmit power to the minimum level
- Results
  - Energy efficient under wide range of traffic load
  - High channel utilization during high traffic load

Highlights from Paper 3

"Route Optimization Based On The Detection of Triangle Inequality Violations"

- Propose a new metric "RPMO" and a route optimization method
  - RPMO is based on the Ratio of Prediction and the Average Oscillations of the estimated distances, to detect the potential TIVs.
  - Uses TIVs to optimize the routing in Overlay Network
- Results
  - "RPMO" metric gives better performance compared to metrics presented in OREE
  - Metric MDGD detects the best shortcuts of TIV triangle with accuracy of 81%.

Conclusions/Recommendations

- 3 optimisations of Layers 1 – 3
  - Physical: Free-space optical system to transfer digital broadcasting terrestrial signals
  - Data link: Medium access control protocol (IH-MAC) for WSNs
  - Network: Optimize routes of overlay network detecting Triangle Inequality Violations in Layer 3 networks
- Paper 1 has this advantage
  - 1550 nm as the transmission wavelength allows the seamless connection between FSO beam and SMF, eliminating O/E conversions

Conclusions/Recommendations

- Recommendations for Paper 1
  - 1.3μm should also considered since they are the majority in access networks
  - Usages of 1km FSO transmission from the network system design point of view should be discussed
- Paper 2 has the advantages
  - Provides the better energy efficiency than S-MAC
  - Using RTS/CTS handshakes to adapt the transmit power is a good evolution from existing technologies

Conclusions/Recommendations

- Recommendations for Paper 2
  - Real implementation is necessary to standardize this technology
- Paper 3 has the advantages
  - Metric RPMO is better than OREE and the detection rate of MDGD is 81%.
- Recommendations for Paper 3
  - Need an intuitive description why MDGD is good at detecting the best shortcuts
  - Surveys on IETF Application-Layer Traffic Optimization (ALTO) WG will contribute to the future direction of this issue.

1. Invited Paper: Effective Collaborative Monitoring In Smart Cities: Converging MANET And WSN For Fast Data Collection/ **Giuseppe Cardone, Antonio Corradi** (University of Bologna, Italy)
2. SOA Driven Architectures for Service Creation through Enablers in an IMS Testbed/**Mosiuoa Tsietsi** (Rhodes University, South Africa) *
3. A Virtualized Infrastructure for IVR Applications as Services/ **Fatna Belqasmi** (Concordia University, Canada) *
4. Seamless Cloud Abstraction, Model and Interfaces/ **Masum Z. Hasan** (Cisco Systems, USA)

Session 6 - Architectures to support a fully networked society
Chair: Ved P. Kafle
National Institute of Information and Communications Technology, Japan

6.1 **Invited Paper**: Effective Collaborative Monitoring In Smart Cities: Converging MANET and WSN For Fast Data Collection/Giuseppe Cardone, Antonio Corradi (University of Bologna, Italy)

- Proposal of MANET and WSN integration to monitor quality of life indicators in Smart Cities
- MANET using mobile phones as ad hoc routers; proposal of WSN hybrid routing protocol (WHOO) for differentiated forwarding of urgent and non-urgent data
- Designed software architecture; evaluated through simulation; achieved reduced latency
- Highlighted the need for widely acceptable standards

6.2 SOA Driven Architectures for Service Creation through Enablers in an IMS Testbed/ Mosiuoa Tsietsi (Rhodes University, South Africa)

- Proposed Extended IMS Service Layer (EISL)
  - Consisting of network personnel, service broker, data repositories, application servers
  - Exposing controllable API to service developers
- Overviewed activities of OMA, Parlay group (joint standardization by 3GPP and ETSI)
- Implemented EISL for simulation
- Gave service development case study (using HTTP interfaces)
- Emphasized open standardizations

6.3 A Virtualized Infrastructure for IVR Applications as Services / Fatna Belqasmi (Concordia University, Canada)

- Proposal of infrastructure virtualization architecture for Interactive Voice Response services over
  - Cloud computing facilities
- IVR services can use different virtualized substrates simultaneously
  - Maximizing utilization and efficiency
- Shown a case study of using different substrates to realize a composite service (developing software)

6.4 Seamless Cloud Abstraction, Model and Interfaces/ Masum Z. Hasan (Cisco Systems, USA)

- Overviewed Cloud's benefits – resources acquired and released on demand; pay per use
- Covered IaaS aspects of Hybrid Cloud (resources distributed in the enterprise intranet and public cloud); enterprises execute apps on these distributed resources seamlessly.
- Discussed issues of tenant facing Abstraction & Interfaces
  - Multiple tenants sharing end-to-end
  - Isolation abstraction
  - Network isolation; QoS abstraction
- Standardization of interface, abstraction definition or language is essential

Conclusion/Recommendations

- 4 papers investigating important aspects of network architecture and infrastructures discussed
  - MANET + WSN Integration
  - Unified network abstraction and interfaces for utilizing distributed resources
  - 2 best paper award nominees
- Technologies/case studies presented in the papers can be useful inputs to ITU
  - IoT-GSI
  - Focus Group on Cloud
  - For example, ITU can help with Recommendations for interoperability of multiple cloud service providers

1. Regulation of Bearer / Service Flow Selection between Network Domains for Voice over Packet Switched Wireless Networks/ **Nikesh Nageshar** (University of the Witwatersrand, South Africa)
2. Accessibility support for persons with disabilities by Total Conversation Service Mobility Management in Next Generation Networks/ **Leo Lehmann** (OFCOM, Switzerland)
3. LabQoS: A platform for network test environments / **Luis Zabala** (University of the Basque Country, Spain)

Session 7 - Service Quality for a fully networked society
Chair: Mostafa Hashem Sherif
General Chair, Kaleidoscope
AT&T, USA

Regulation of Bearer / Service Flow Selection between Network Domains for Voice over Packet Switched Wireless Networks

- End-to-end voice quality in tandemed LTE networks
- Proposal is to add voice network parameter networks (f) to measure the contribution of a given domain to
  - Maximum packet loss
  - Maximum packet jitter
  - Maximum packet delay

Accessibility support for persons with disabilities by Total Conversation Service Mobility Management in Next Generation Networks

- Functional architecture for managing service mobility for persons with disabilities based on available recommendations/ standards
- Distributed procedure (access and core)
- Procedure varies depending on the type of disability
- Can be used in any IP network architecture with convergence

LabQoS: A platform for network test environments

- LabQoS is a test environment and generic platform for measuring quality of service
- Provides a uniform tool to measure the performance of experiments related to performance management of Internet applications and services
- Integrates proposals made by other research teams since 2003

Conclusions/Recommendations

- Investigate the concept of using predefined voice pointer to facilitate the direction of voice bearers to high priority transport QoS classes
- Promote the functional architecture to support mobility of persons with disabilities
- Encourage various research teams to use/add to LabQOS

A Highly Personal View of the Confrence

Wrap-up Session
Chair: Kai Jakobs
TPC Chair, Kaleidoscope 2011
RWTH Aachen University, Germany

Overall

A very well organised event.

- great location,
- very good facilities,
- interesting presentations,
- varied programme,
- good food,
- Very helpful people.

Strengths I

- Participants from both industry and academia

  => fosters exchange of ideas, may provide 'reality check' for academics.
- Exposes academics to standards-related issues.
- Is multi-disciplinary

  => Broad coverage, avoids tunnel vision, helps get the bigger picture
- Attracted a fairly large and varied crowd.

Strengths II

- Attracted many researchers from the country and the region.
- Comparably low acceptance rate.
- Papers will be in IEEEXplore.
- Participation is free of charge (excellent value for money).

Weaknesses

- **Still not known widely enough.**
- Doesn’t attract the ‘big guys’ (that might, in turn, attract people).
- Perhaps perceived as akin to a ‘boring standards event’ that is only attended by the grey-haired ones anyway.

  => completely unsexy.

Opportunities

- May support development from ‘paper’ to ‘standard’ (to product or service).
- Help close the gap between academia and standardisation.
- Foster interaction between industry, standardisation, and academia (and between academics from different disciplines).

Threats

- Limited or no academic recognition.
- 'Competing' events.
- Lack of relevant education.
- Decreasing interest in standardisation issues in the technical, socio-economic, and policy areas.

Thanks to all of you.

I hope to see you,
and many others,
at the next 'Kaleidoscope' event.