ITU-T Kaleidoscope 2010
Beyond the Internet? - Innovations for future networks and services

Wrap up session

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

Session chairman:
Mostafa Hashem Sherif (AT&T, USA)

Pune, India, 13 – 15 December 2010

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S2.1 Invited paper Toward a polymorphic future internet: a networking science approach - **Kavé Salamatian** (Université de Savoie, France)
S2.2 Introducing elasticity and adaptation into the optical domain toward more efficient and scalable optical transport networks -**Masahiko Jinno** (NTT, Japan)
S2.3 Introducing multi-ID and multi-locator into network architecture - **Ved P. Kafle** (National Institute of Information and Communications Technology, Japan)
S2.4 How can an ISP merge with a CDN? - **Kideok Cho** (Seoul National University, Korea)

Session 2 – Rethinking the network
Helmut Schink (NSN, Germany)

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S2.1 Invited paper: Toward A Polymorphic Future Internet: An Internet Science Approach

Kavé Salamatian (Professor, LISTIC, Université de Savoie)

Recommendations

- Future Internet should be polymorphic
  - Enable the coexistence of different networking paradigms in the same framework
  - Virtualisation is a key enabler
- Future Internet needs a networking science as an interdisciplinary cooperation

S2.2 Introducing Elasticity and Adaptation into the Optical Domain Toward More Efficient and Scalable Optical Transport Networks

Masahiko Jinno, Yoshiaki Sone, Osamu Ishida, Takuya Ohara, Akira Hirano, Masahito Tomizawa (NTT, Japan)

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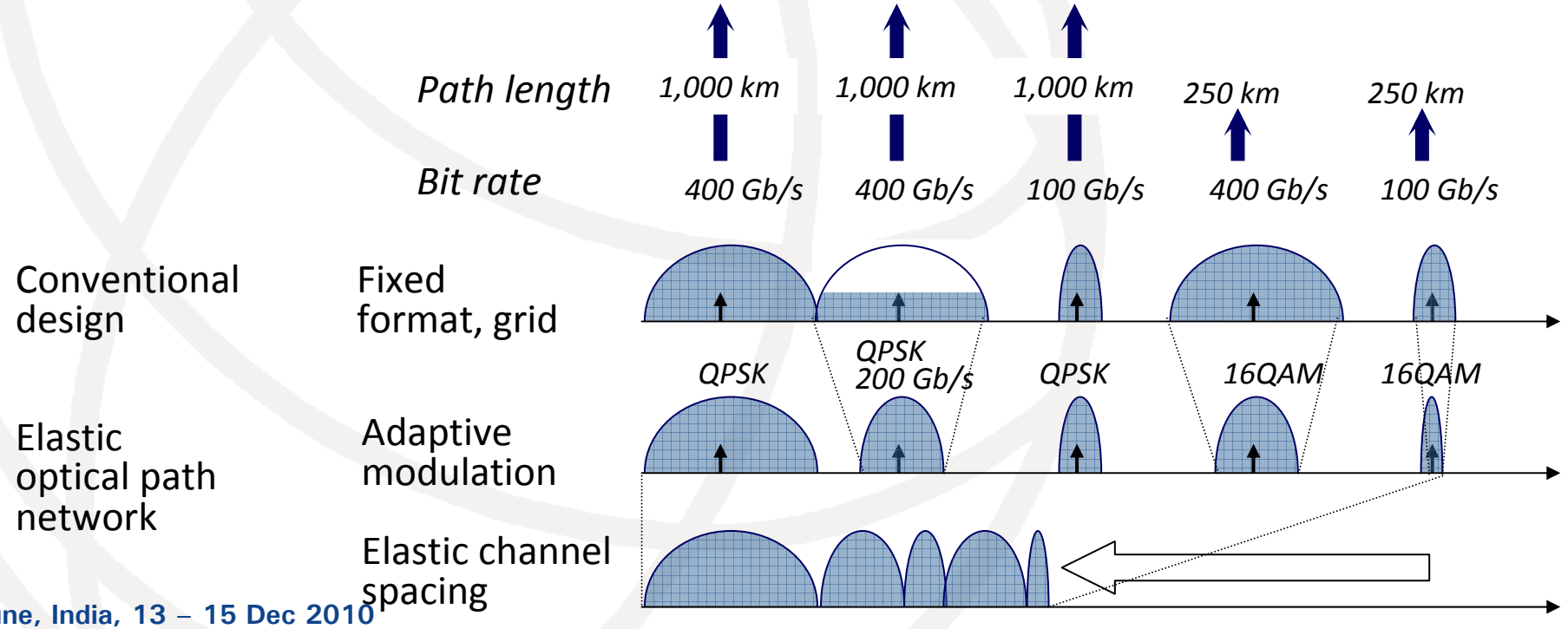
Elastic Optical Path Network

- Spectrum-efficient transport of 100 Gb/s services and beyond through introduction of elasticity and adaptation into optical domain



Possible Standard Extensions

- Frequency Grid (G.694.1)
- ASON Control Plane (G. 805, G.7713, G.7714, and G.7715)
- GMPLS protocols (IETF, OIF, ITU-T SG15)
- New parameters in signaling messages

S2.3 Introducting Multi-ID and Multi-Locator into Network Architecture

Ved P. Kafle, Masugi Inoue (National Institute of Information and Communications Technology, Japan)

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Motivation

- Why Multiple IDs?
  - network-protocol independent multicast, group-cast, or geo-cast
  - service differentiation
  - optimal network/path selection
  - private and public communication
  - dynamic relationship between users, services, and hosts
- Multilocators are needed for
  - mobility
  - multihoming
  - heterogeneous network protocols
  - privacy, etc.

Items for Standardization

- Service representation and discovery
- Host ID configuration
- ID-to-locator mapping, etc.

S2.4 How can an ISP merge with a CDN?

Kideok Cho, Hakyung Jung, Munyoung Lee, Diko Ko, Taekyoung Kwon, Yanghee Choi (Seoul National University, Korea)

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ISP-centric Content Delivery (iCODE)

- Exploits in-network storage attached to network entities (e.g., routers) for content delivery services
- Assumes that every content is identified by a uniform resource identifier (URI)
- Main advantages of iCODE
  - User experience: stable and reduced latency of content transfer
  - ISP incentives: inter-ISP traffic reduction, traffic engineering, and new business model
  - Incremental deployment is possible

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S3.1 Invited paper Can computational thinking reduce marginalization in the future internet? - **Peter Wentworth** (Professor, Rhodes University, South Africa)

S3.2 Invited paper Challenges the Internet poses to the policymaker - **Arun Mehta** (President, Bidirectional Access Promotion Society, India)

S3.3 Participatory approach to the reduction of the digital gap in Amazon Region of Ecuador in the framework of the "innovation for development" program - **Daniele Trinchero** (Politecnico di Torino, Italy)

Session 3 – The future internet is for all

Mostafa Hashem Sherif (AT&T, USA)

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S3.1 Invited paper: Can computational thinking reduce marginalization in the future internet?

Peter Wentworth (Professor, Rhodes University, South Africa)

- The evolution of the internet from a data repository to a programmable service platform can be used to help disadvantaged communities, including through non-commercially viable services
- There is a need to study how to stimulate procedure knowledge and abstraction thinking through computational tools

S3.2 Invited paper: Challenges the Internet poses to the policymaker

Arun Mehta (President, Bidirectional Access Promotion Society, India)

- Moving "beyond the Internet" is not a realistic goal because
  - The "Internet" is ill-defined
  - Proponents of a clean slate approach are not clear on how to deal with existing communities using the current Internet
  - There is nobody in charge with the Internet and Internet governance have not progressed
  - Previous attempts to challenge the Internet have failed
- ITU needs to work to work with other standards groups to
  - Resolve existing problems such as junk mail filtering
  - To provide wide access to everybody, including persons with disability

S3.3 Participatory approach to the reduction of the digital gap in Amazonian Ecuador in the framework of the "innovation for development" program

Alessandro Galardini, Daniele Trinchero, Benedetta Fiorelli (Politecnico di Torino); Salvatore Pappalardo (University of Padova, Italy)

- The paper presents a methodology for the transfer and absorption of equipment and knowledge on a low cost wireless platform
- A case study of a simplified and low cost solution in Ecuador was discussed.

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S4.1 Invited paper: A vision on the information and communication technologies using cloud computing environment - **Hiroshi Yasuda** (Tokyo Denki University, Japan)
S4.2 Hybrid circuit/packet networks with dynamic capacity partitioning -**Chaitanya S. K. Vadrevu (**University of California, USA)
S4.3 A New Protocol Layer for User Space Functionality - **Pankaj Chand** (Independent Researcher, India)
S4.4 Quality of service in the future internet - **Jorge Carapinha (**Portugal Telecom Inovação, Portugal)

Session 4 – Protocol evolution and the future internet

Daniele Trinchero (iXem Labs – Politecnico di Torino)

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S4.1 Invited paper: A vision on the information and communication technologies using cloud computing environment

Hiroshi Yasuda (Professor, Tokyo Denki University, Japan)

- The paper presents an activity carried out in Japan, for the development of an effective and simple tool for allowing non-experienced people making 3D motion image content
- The Digital Movie Director is addressing the task, and an example has been shown during the presentation. Unfortunately, it requires a huge computational effort
- Cloud computing technology can help future prospects of the 3D motion image content industries

S4.2 Hybrid circuit/packet networks with dynamic capacity partitioning

Chaitanya S. K. Vadrevu, Menglin Liu, Biswanath Mukherjee (University of California, USA); Chin Guok, Evangelos Chaniotakis, Inder Monga (Energy Sciences Network, USA); Massimo Tornatore (Politecnico di Milano, Italy)

- Hybrid circuit/packet networks normally do not share capacity between the packet and the circuit sections
- The paper proposes schemes that enable efficient capacity partitioning between packet and circuit networks
- The schemes ensure survivability and robustness of the services
- Capacity partitioning between packet and circuit networks enables to enhance quality of service and robustness with improved resource utilization

S4.3 A New Protocol Layer for User Space Functionality

Pankaj Chand (Independent Researcher, India)

- The paper introduces a new layer of protocols into the Internet protocol stack to support future usage in the Internet
- It considers the User Space as a significant entity in the Internet model and aims to standardize it
- Introduces the Entity Layer between Transport and IP Layers
- It also presents the Identifier/Interlocutor/ Locator split architecture for flexible addressing
- It suggests to study the evolution of the Entity layer along with the User's role in the Internet

S4.4 Quality of service in the future internet

Jorge Carapinha (Portugal Telecom Inovação, Portugal); Christoph Werle (Universität Karlsruhe (TH)); Konstantin Miller (Berlin Institute of Technology); Roland Bless (Karlsruhe Institute of Technology);Horst Roessler, Heidrun Grob-Lipski (Alcatel-Lucent); Andrei Bogdan Rus, Virgil Dobrota (Technical University of Cluj-Napoca, Romania)

- The European 4Ward project proposes novel networking approaches for the future Internet:
  - Network Virtualization;
  - In-Network Management;
  - Generic Path Semantic Resource Management.
- QoS represents a crucial requirement for the future networks; new approaches introduce new QoS challenges and require solutions
- Each of those approaches brings fresh ideas and potential solutions to handle QoS, particularly taking into account requirements of dynamicity, flexibility, adaptability and scalability

Conclusions

- The session demonstrates the effort spent by researchers on several fields:
  - assistance to end-users, to mature an improved knowledge and assist exploitation of Internet content producing tools
  - development of new network architectures, new protocol layers, new network approaches with their related QoS
- Generally speaking, the future Internet is needing the development of advanced protocols and schemes at any Layer and also across the Layers

Recommendations

- The architecture of the Net is evolving towards new heterogeneous solutions
- Efforts are being dedicated to the user, developing user-based applications, user-based protocols, future work is welcome
- Efforts are being dedicated to develop new networking approaches for the future Internet, future work is welcome
- ITU may take profit of these efforts, for the standardization activity

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S5.1 Cross-language identification using wavelet transform and artificial neural network - **Shawki A. Al-Dubaee** (Aligarh Muslim University, India)
S5.2 GeoHybrid: a hierarchical approach for accurate and scalable geographic localization - **Bamba Gueye** (University Cheikh Anta DIOP of Dakar, Senegal)
S5.3 Context-aware smart environments enabling new business models and services -**Boris Moltchanov** (Telecom Italia, Italy)
S5.4 Innovative tangible user interface as a mean for interacting telecommunications services - Klemen Peternel (University of Ljubljana, Slovenia)

Session 5 – Service Innovations in the Future Internet

Peter Wentworth (Rhodes University, South Africa)

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S5.1 Cross-language identification using wavelet transform and artificial neural network

Shawki A. Al-Dubaee (Aligarh Muslim University, India)

- Search is now key driver for accessing content.
  - Currently multi-lingual search has to be individually specialized for each language.
- Treats search documents as signal, applies signal processing (preprocessing, wavelet transforms, using coefficients to training neural network, classification using Haar classifier) can accurately pre-classify and dispatch Urdu and English documents to language-specific stores.
- Generalizes search in two ways: one mechanism works for many languages, and it works for more than just text – chemical formulae, mathematical formulae, etc.

S5.2 A hierarchical approach for accurate and scalable geographic location

Ibrahima Niang, Bamba Gueye, Bassirou Kasse (University Cheikh Anta DIOP of Dakar, Senegal)

- Location-based services becoming increasingly important for targeted information
- Proposal for improving geolocation estimates
  - Efficient and scalable
  - Probes network from small number of regional geo-landmarks (from database) to refine geo estimates.
- Proposes middleware layer service for providing and accessing geolocation services:
  - Clear ITU-T opportunity and need for standards around geolocation.

S5.3 Context-aware smart environments

Christian Mannweiler (University of Kaiserslautern, Germany); Jose Simoes (Fraunhofer FOKUS, Germany); Boris Moltchanov (Telecom Italia, Italy)

- Focus on new business models ...
- Smart spaces – cities, cars, home, ... with interacting and context-aware devices *"Need for generic but very smart content provisioning" .*
- Context data acquisition; analysis; and use.
- Context management architectured with federation of context providers.
- Work done under EU Framework Programme 7, with trials in Telecom Italia.
- How we manage context information clearly of great interest to ITU-T.

S5.4 Innovations using tangible user interface as means of interacting with telecommunication services

Klemen Peternel, Luka Zebec, Andrej Kos (University of Ljubljana, Slovenia)

- Human interaction with "things" as gateway to easier use of telecoms service.
  - Targets aging and disabled who find it difficult!
- Near-field sensors in device with cheap tags on things – photos of family, etc.
- Interesting "tangible" interface to some standard services (SMS composition, call, call transfer, multi-party call).
- Question time was interesting too, e.g. "This breaks mobility – why not rather voice recognition?", and "Can we make the "things" interactive / responsive?

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S6.1 How Many Standards in a Laptop - **Brad Biddle** (Arizona State University, USA)

S6.2 A User-centric Approach to QoS Regulation in Future Networks - **Eva Ibarrola** (University of the Basque Country, Spain)

S6.3 Competition and Cooperation in the Formation of Information Technology Interoperability - **Jai Ganesh** (Infosys Ltd, India)

Session 6 – Regulation, standardization and stakeholder participation

Ian Graham (University of Edinburgh Business School, UK)

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S6.1 "How Many Standards in a Laptop"

Brad Biddle, Andrew White, Sean Woods (Arizona State University, USA)

- Laptops are plastic boxes of standards
- Within these standards a split between Royalty Free, RAND and Pool standards
- The dominant model is increasingly RAND, either with or without royalties
- Convergence between consortia and SDOs

S6.2 A User-centric Approach to QoS Regulation in Future Networks

Eva Ibarrola, Fidel Liberal, Armando Ferro (University of the Basque Country, Spain); Jin Xiao (University of Waterloo, Canada)

- Growing importance of Quality of Service in the regulation of telecom services
- Monitoring of QoS is not a wholly technical issue, it should be derived from user needs and user perceptions
- Blend of speed, availbility and customer care
- Outlines a methodology to operationalise ITU-T QoS framework

S6.3 Competition and Cooperation in the Formation of Information Technology Interoperability

Jai Ganesh (Infosys Technologies Ltd, India)

- A biography of SOAP, WSDL and UDDI as standards, leading to a five stage process model of standards development
- Significant role of Microsoft and IBM in shaping standards
- Drew on loose network of users to shape standards

Conclusions

- All three papers demonstrate the value of studies combining the social analysis of innovation with a close engagement with the technology.
- NOT just analyses of business models or improvements in the technology
- Value is in
  - making technologists aware of significance of standards and need to meet user need
  - making business specialists aware of flexibility of technology

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S7.1 Performance comparison of intelligent jamming in Rf (physical) LAYER with WLAN Ethernet router and WLAN Ethernet bridge - **Rakesh Jha** (Sardar Vallabhbhai National Institute of Technology, India)
S7.2 Self-organized spectrum chunk selection algorithm for local area LTE-Advanced - **Sanjay Kumar** (Birla Institute of Technology, India)
S7.3 On the design of ultra wide band antenna based on fractal geometry - **Pranoti Bansode** (Defence Institute of Advanced Technology, India)
S7.4 Design of inscribed square circular fractal antenna with adjustable notch-band characteristics - **Raj Kumar** (University of Pune, India)
S7.5 Resonant frequencies of a circularly polarized nearly circular annular ring microstrip antenna with superstrate loading and airgaps - **Jayashree Shinde** (Sinhgad Academy of Engineering, India)

Session 7 – Radio Technologies and the future internet

Felipe Rudge Barbosa (University of Campinas/Unicamp – Brazil)

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S7.1 Performance comparison of intelligent jamming in Rf (physical) LAYER with WLAN Ethernet router and WLAN Ethernet bridge

Rakesh Jha, Upena D. Dalal (Sardar Vallabhbhai National Institute of Technology, India)

- The title summarizes well the paper content; good paper on security and service survivability;
- Very good and concise presentation – Young Author certificate recipient;
  - the only one to keep ahead of time (14')

S7.2 Self-organized spectrum chunk selection algorithm for local area LTE-Advanced

Sanjay Kumar (Birla Institute of Technology, India); Yuanye Wang, Nicola Marchetti (Aalborg University, Denmark)

- Basically the proposition is to improve efficiency of usage of available RF spectrum in wireless local systems)
  - Well- and clearly presented; Dr. Kumar is a professor;
  - Chairman had to control time (softly).

S7.3 On the design of ultra wide band antenna based on fractal geometry

Pranoti Bansode (Defence Institute of Advanced Technology, India); Raj Kumar (University of Pune, India)

- This paper presents ultra wide band circular fractal antenna. Better than conventional simple circular disc monopole antenna. This type of antenna can be useful for UWB system and sensing applications
- The paper was well presented and Pranoti received Young Author certificate;
- Chairman had to control time (softly).

S7.4 Design of inscribed square circular fractal antenna with adjustable notch-band characteristics

Raj Kumar (University of Pune, India); Kailas Sawant, Jatin Pai (Defence Institute of Advanced Technology, India)

- Author **did not show up** and did not send presentation
- This Chairman suggests that authors should be advised to make sure papers CAN be presented (by presence, by Internet , by someone else)
  - Maybe the paper was blocked by the agency…

S7.5 Resonant frequencies of a circularly polarized nearly circular annular ring microstrip antenna with superstrate loading and airgaps

Jayashree Shinde (Sinhgad Academy of Engineering, India); Pratap Shinde, BrajKishor Mishra (NMIMS University, India); Raj Kumar (DAIT University, India); Mahadeo Uplane (Shivaji University, India)

- This paper presents an analysis for the resonant frequencies and its various harmonics of a nearly Circular Annular Ring Microstrip Antenna (ARMSA) with and without air gaps and superstrate loadings.)
  - Jayashree presented well and clearly; but,
  - Chairman had to pull time (softly).

Conclusions / Recommendations

- The session went very well;
- The issues were all pertinent to the title and well presented.
- Authors did careful preparation of presentations;

- SUGGESTION/RECOMM:
  - Authors should be CLEARLY instructed that a paper must be PRESENTED once selected;
  - Either by presence, by Internet, or by someone else;)

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S8.1 A Scheme for Disaster Recovery in Wireless Networks with Dynamic Ad-hoc Routing - **Guowei Chen** (Waseda University, Japan)
S8.2 A new study on network Performance under link Failure in OPS/OBS High-Capacity Optical Networks - **Felipe Rudge Barbosa** (University of Campinas, Brazil)
S8.3 Business scheme for shifting from existing networks to Trusted Green Networks - **Yoshitoshi Murata** (Iwate Prefectural University, Japan)
S8.4 Innovative ad-hoc wireless sensor networks to significantly reduce leakages in underground water infrastructures - **Daniele Trinchero** (Politecnico di Torino, Italy)

Session 8 – Future Internet and Environment
Mitsuji Matsumoto (Waseda University, Japan)

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S8.1 A Scheme for Disaster Recovery in Wireless Networks with Dynamic Ad-hoc Routing

Guowei Chen, Aixian Hu, Takuro Sato (Waseda University, Japan)

- This paper has proposed a location-based ad-hoc routing protocol used in a hybrid wireless system.
- The focus is to maintain connectivity in the aftermath of a disaster.
- Simulation results shows that even only a small part of the nodes can directly connect to a BS, but most nodes can route to a BS.
- It outperforms the Beaconing protocols in terms of resistance to mobility

S8.2 A new study on network Performance under link Failure in OPS/OBS High-Capacity Optical Networks

Felipe Rudge Barbosa, Indayara Martins, Edson Moschim
(State University of Campinas - Unicamp, Brazil)

- Motivation; In the Metro-Access application, to offer granularity and capacity, without significant Network latency and energy consumption.
- Solution: Introduce the OPS/OBS technologies
- Important aspects: service survivability and network protection under link failure.
- To evaluate the Modeling involving mesh and ring topologies, simulation has been done
- Innovative variations of mesh and ring with various interconnections of optical nodes in OPS/OBS networks offer better performance and robustness without necessarily impacting on installation costs.

S8.3 Business scheme for shifting from existing networks to Trusted Green Networks

Yoshitoshi Murata (Iwate Prefectural University, Japan)

- Paper on the realization for Trusted Green Networks (TGN) was mentioned.
- Ns will solve the following problems for the sustainability of mankind.
  - ✓ Increment of the calorific value on network related devices
  - ✓ Lack of trust and security
  - ✓ Digital divide by location
- TGN-Cap and Trade will promote shifting from existing networks to TGNs organized by ITU.

S8.4 Innovative ad-hoc wireless sensor networks to significantly reduce leakages in underground water infrastructures

Daniele Trinchero, Riccardo Stefanelli, Luca Cisoni (Politecnico di Torino, Italy); Abdullah Kadri, Adnan Abu-Dayya, Mazen Omar Hasna, Tamer Khattab (Qatar University, Qatar)

- Current Problem:
  (1) Constant increase of water demand
  (2) Exponential decrease of natural resources
  (3) Leakages in underground water infrastructures is significant **(Up to 70%)**
- Questions: Is the water distribution system able to address these changes?
- Expedite and refine leakage identification procedures
- How to find breaks along the path?
- Solution: Development of Ad-hoc wireless sensor networks. Developing the sensing tool by Antenna.

Conclusions/Recommendations

- Session 8 discussed the Substantial Application based on ICT.
  - ✓ Recovery technology for Wireless Networks damaged by Disaster. Standardization is requested
  - ✓ OPS/OBS well implemented in the Metro-Access application, high capacity, low Latency.
  - ✓ Realization for Trusted Green Networks (TGN) solving Power consumption in Network has been interested to the Standardization.
  - ✓ Saving water technology was introduced. The technology was requested to realize as soon as possible and requested to offer or collaborate in many countries.