

ITU Kaleidoscope 2015
Trust in the Information Society

Wrap up Session

Summary of the seventh Kaleidoscope conference
Panel with **Session Chairs**

Session Chair:

Mostafa Hashem Sherif (AT&T, USA; Kaleidoscope Steering
Committee member)

Barcelona, Spain
9-11 December 2015



Session 1 – Trust in the Infrastructure

S1.1 Invited paper: Strengthening Trust in the Future ICT infrastructure

Jun Kyun Choi (KAIST), Korea

S.1.2: Wi-Trust: Improving Wi-Fi Trustworthiness with Computational Trust Management

Jean-Marc Seigneur (University of Geneva, Switzerland)

S.1.3: WifiOTP: Pervasive Two-Factor Authentication Using Wi-Fi SSID Broadcasts

Emin Huseynov (University of Geneva, Switzerland)

S.1.4: Vulnerability of Radar Protocol and Proposed Mitigation

Eduardo Casanovas, Tomas Buchailot and Facundo Baigorria

(Instituto Aeronáutico, Argentina)

Session Chair

Kai Jakobs (RWTH Aachen University, Germany; Kaleidoscope
Technical Programme Committee Chair)

Barcelona, Spain

9-11 December 2015



Highlights of Session 1

- **Paper 1:** “Strengthening Trust in the Future ICT Infrastructure”
 - Trust is needed in the complex environment of IoT (also the message from Paper 2 of the same session and of Viardot’s keynote speed)
 - There should be an integrated approach for the standardisation trust if future ICT infrastructure
- **Paper 2:** “Wi-Trust: Improving Wi-Fi Trustworthiness with Computational Trust Management”
 - The paper shows a concrete proposal in Wi-Fi
- **Paper 3:** “WifiOTP: Pervasive Two-Factor Authentication Using Wi-Fi SSID Broadcasts”
 - The paper presents a simple and low cost method for implementing a two-factor authentication technique using WI-FI.

Highlights from Paper 4

“Vulnerability of Radar Protocol and Proposed Mitigation”

- An eye opener –something as vital as Radar is so potentially vulnerable.
- The proposed mitigation depends on some encryption and integrity protection.
- It was not clear how adequate encryption/decryption can be performed apparently without any performance problems.

Conclusions and Recommendations

- There seems to be an apparent need to develop technologies and services that require input from different disciplines (e.g. IoT, trust). This may have significant ramifications for the standardisation landscape. We should start thinking about these ramifications and act accordingly.
- Developing technologies that increase ease of use of security mechanisms is one thing. To try and educate consumers/users about the importance of security might be an even more sustainable approach.
- It would also appear that a closer look at 'old' ICT systems may well reveal severe security deficiencies.



Session 2 – Trust through Standardization

S2.1 Raising trust in security products and systems through standardisation and certification: the CRISP approach*

Irene Kamara (Vrije Univesiteit Brussel, Belgium)

S2.2: Drones. Current challenges and standardisation solutions in the field of privacy and data protection

Cristina Pauner and Jorge Viguri (Universitat Jaume I, Spain) and
Irene Kamara (Vrije Univesiteit Brussel, Belgium)

Session Chair

Hiroshi Nakanishi (Malaysia-Japan International
Institute of Technology, Malaysia)

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Highlights from paper 1 “Raising Trust In Security Products And Systems Through Standardisation And Certification: The Crisp Approach ”

- This paper reported on an on-going research in the field of security standardization and certification on the trust aspect, identifying stakeholder needs and recommendations for security standards and certification schemes.
- Definitions proposed:
 - Meaning of standardization for security.
 - Definition of Privacy

Highlights from paper 2 “Drones. Current challenges and standardisation solutions in the field of privacy and data protection”

- This paper analyzes the risks to privacy and data protection from drones and the efforts in Europe to address the problem.
- Some qualitative analysis were given about privacy risks.
- Privacy standards idea for a supportive role to regulations.
- There was a review of current data protection laws
- It is recommended to clarify the definition of privacy and risks and also what standards/regulations should be made.



Session 3 – Trust in the Cloud

S3.1 Regulation and Standardization of Data Protection in Cloud Computing*

Martin Löhe (Technical University Berlin & Fraunhofer FOKUS, Germany)

S3.2 Autonomic Trust Management in Cloud-based and
Highly Dynamic IoT Applications

Tai-Won Um (ETRI, Korea)

S3.3 The Impact of Cloud Computing on the Transformation of Healthcare
System in South Africa

Thembayena Mgozi (University of Pretoria, South Africa)

Session Chair

Helena Mitchell (Georgia Institute of Technology, USA)

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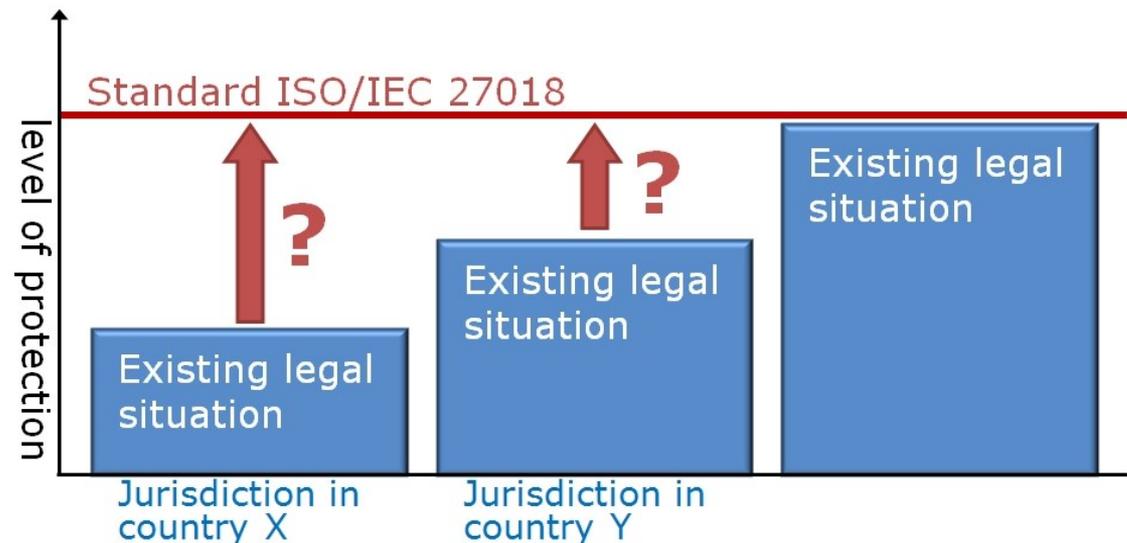


Highlights from paper 1 "Regulation and Standardization of Data Protection in Cloud Computing"

- How can the personal data market be regulated?

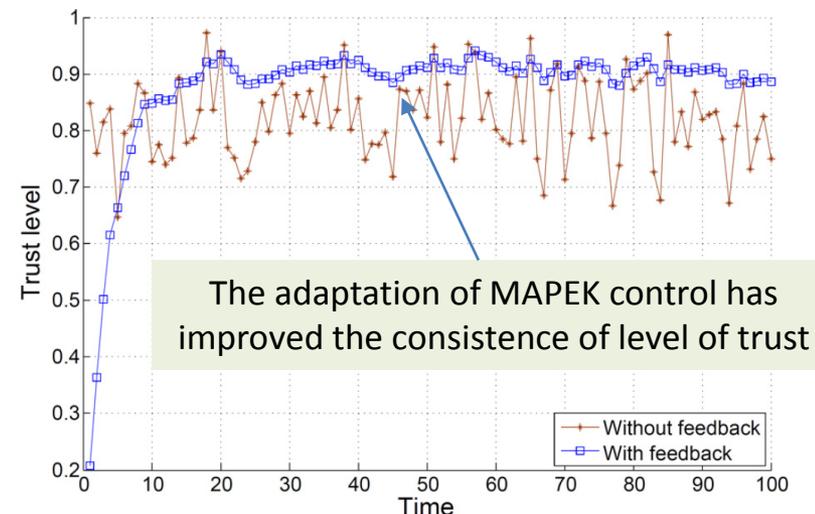
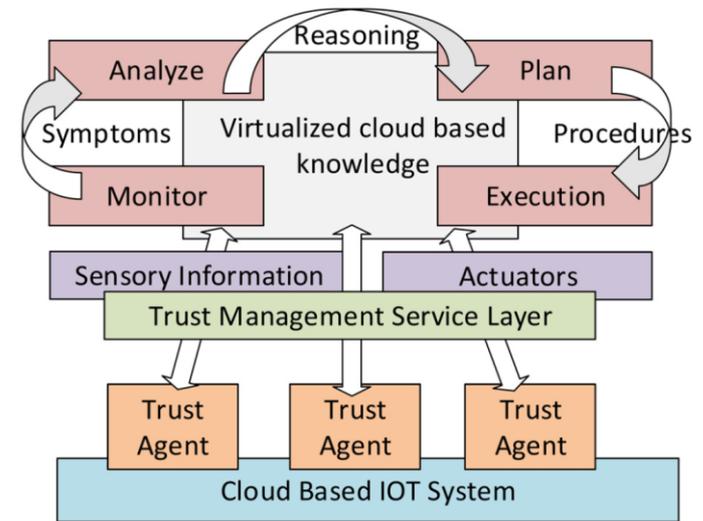


- ISO/IEC 27018 defines vague legal concepts of EU directive
- May provide a basis for trust in cross-border cloud computing
- Has a potential influence on law-makers and harmonization
- Potential for alignment of legal rules in Europe around the level of data protection as reflected in the standard.



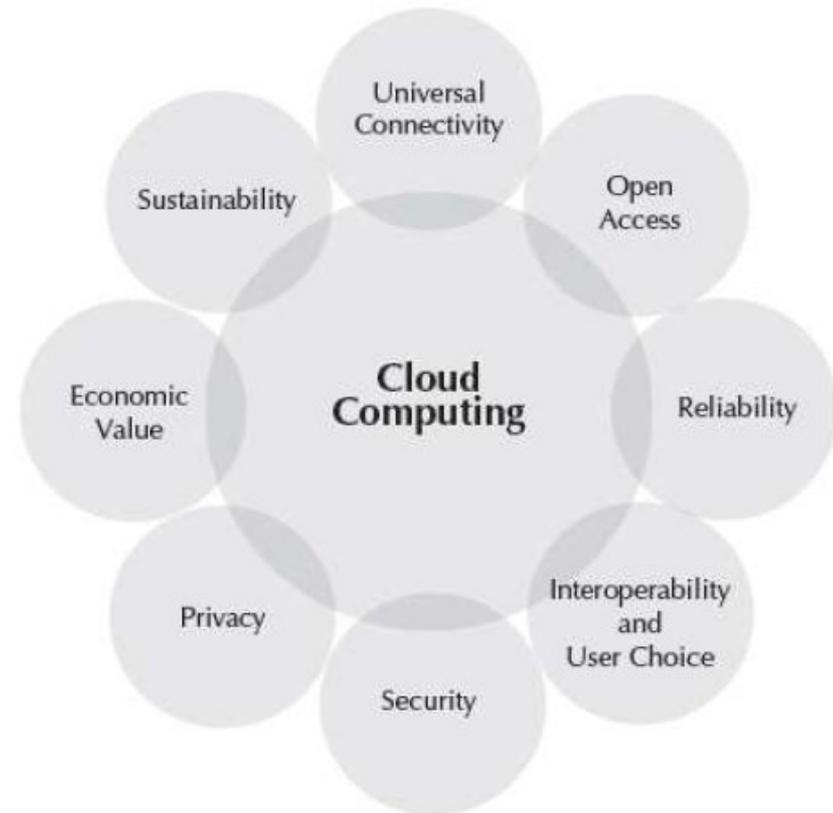
Highlights from paper 2 "Autonomic Trust Management in Cloud-Based and Highly Dynamic IoT Applications"

- Trust as a Service (**TaaS**) smart homes
- Existing trust management protocols do not scale well.
- In smart homes, an **autonomic trust management**
 - based on **MAPE-K** feedback control loop with adaptive trust agents
- Customer satisfaction is considered as proxy for trust in an IoT cloud ecosystem



Highlights from paper 3 “The Impact of Cloud Computing on the Transformation of Healthcare System in South Africa”

- Healthcare systems all over the world are starting to use cloud-based systems
- The goal of the eHealth Program in South Africa is to improve healthcare services
- Largest obstacle is the harmonious integration of ICT systems used in the healthcare system
- To overcome disparate data sources and create the right healthcare policy you need access to reliable data that can be mined into a comprehensive source (the cloud).



Conclusions and Recommendations

- Should we trust in the Cloud?
 - Yes, but there is no reason to trust the Cloud less than a non-cloud equivalent if you take the right measures.
 - Yes, but you have to decide on which business model best fits-for example choosing the appropriate deployment setup (smart home vs medical records).
 - Yes, but only if you can trust your partner and know their intentions, to store sensitive data and information on your behalf.



Session 4 – Advances in networks and services I

S4.1 WhiteNet: A White Space Network for Campus Connectivity
Using Spectrum Sensing Design Principles

Hope Mauwa (University of Wester Cape, South Africa) **PRESENTED**
REMOTELY

S4.2 DCO-OFDM system employing beneficial clipping method
Jiang Liu (Waseda University, Japan)

S4.3 Adaptive Video Streaming Over HTTP through 3G/4G Wireless Network Employing
Dynamic On The Fly Bit Rate Analysis
Dhananjay Kumar (Anna University, India)

S4.4 Cloud Based Spectrum Manager for Future Wireless Regulatory Environment
Moshe Masonta (Tshwane University, South Africa) **NOT PRESENTED**

Session Chair
Vladimir Lavrukhin (SPbSUT, Russian Federation)

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Highlights from Paper 1

“WhiteNet: A White Space Network for Campus Connectivity Using Spectrum Sensing Design Principles”

- There are several ways to measure whether TVWS frequency is occupied
 - Database (DB) approach is most common
 - Energy detection (ED) method has some challenges
- Authors propose to use ED modification:
 - Use more than one detection threshold
 - Use “virtual pricing” of TVWSs identified (the stronger a signal the higher the price)
 - Use cooperative spectrum sensing by several sensors
 - Use channel- and location-clustering
- The measurement results are shown
- The model can reduce the probability of interference

Conclusions and recommendations for Presentation 1

- Conclusions
 - The proposed model can be used only after the transition to digital TV broadcasting in South Africa
 - Channels above 49 will be used for the LTE service
- Recommendations
 - To define the application used by WhiteNet
 - To think about TVWS channel allocation on the borders with other countries
 - To define why the TVWS technology was chosen to provide the Internet service but not any other wireless technology
 - To correct an error in the results section of the paper where the channel 57 is included in two WS groups at the same time

Highlights from Paper 2

“DCO-OFDM system employing beneficial clipping method”

- Visible light communications (VLC) become more and more popular
- DCO-OFDM method is one of the physical layer technologies of VLC systems
- Authors propose the use of beneficial clipping method
 - It allows to improve the transmission performance of the IM/DD DCO-OFDM systems
 - The mathematical model is used to obtain the BER and SNR of the system
 - Simulation results is presented
 - BER dependency on the clipping ratio and modulation depth is shown
 - It is found that the beneficial clipping method can effectively reduce the system BER

Conclusions and recommendations for the Presentation 2

- Conclusions
 - The proposed method is interesting and forehanded
 - It is recommended to continue research
- Recommendations
 - To compare the proposed method and the pulse shaping technique
 - To think how to associate SNR values with applications (voice, video, data)
 - To think about MAC protocol used to avoid the interference between several VLC systems
 - To think about an experimental setup
 - To clarify that the proposed method is used in downlink only

Highlights from Paper 3

“Adaptive Video Streaming Over HTTP through 3G/4G Wireless Network Employing Dynamic On The Fly Bit Rate Analysis”

- 3G/4G connections are not stable in terms of uplink/downlink speed and video streaming is a challenge
- Authors propose a new system with dynamic on the fly bitrate analysis
 - The system employs the client server model
 - The system uses the bit rate feedback from the client to the server
 - Algorithms of the client and the server were presented
 - Implementation results are shown
 - Peak Signal to Noise Ratio (PSNR) and Structural Similarity (SSIM) Index are calculated after experimental study

Conclusions and recommendations for the Presentation 3

- Conclusions
 - The proposed system is not suitable for mission critical applications like telemedicine (surgery etc.) because of delays
 - The proposed system is good for entertainment applications like sport games streaming etc., because it allows to see the picture when the network connection is fail
- Recommendations
 - Don't propose the system for telemedical applications as large delays are possible
 - To make the clear comparison with MPEG-DASH technology
 - To be more careful regarding the performance of the proposed system in 4G networks because of the shared resource allocation

Conclusions and Recommendations

- Three of the four papers were presented in the Session 4 “Advances in networks and services I”
- All proposed studies are addressed the problems of advanced communication system design
- Presentations 2 and 3 propose very practical methods that have to be implemented in real world applications



Session 5 – Advances in networks and services II

S5.1 Seamless Mobility in Data Aware Networking

Jairo López (Hitachi Ltd. Research and Development Group, Japan)

S5.2: Proactive-caching based Information Centric Networking Architecture for Reliable Green Communication in Intelligent Transport System*

Takuro Sato (Waseda University, Japan)

S5.3: Network Failure Detection System for Traffic Control using Social Information in Large-Scale Disasters*

Chihiro Maru (Ochanomizu University, Japan)

Session Chair
Ved Kafle (NICT, Japan)

Barcelona, Spain
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Highlights from Paper 1

“Seamless Mobility in Data Aware Networking”

- Summary
 - Introducing metrizable hierarchical topological namespace for nodes
 - Improving average network delay, data rate and extreme packet loss in mobility
 - Validation by simulation
- Significance
 - Not requiring changes in the global DAN namespace
 - Scalable as there are no “special” nodes or services

Highlights from Paper 1

(Standardization perspectives)

- Node namespaces
- Mechanisms of nodespace allocation; guidelines for network operators choosing namespace fitting their requirements

Highlights from Paper 2

“Proactive-caching based Information Centric Networking Architecture for Reliable Green Communication in Intelligent Transport System”

- Proposed and evaluated a cross-layer wireless content access model in ICN (DAN) for ITS
- Significance
 - Providing high performance data downloading to mobile passengers
 - Greening network
 - 20% reduction in power consumption

Highlights from Paper 2

(Standardization perspectives)

- Relevant to scalable, cost-efficient content distribution, mobility and disruption tolerance as identified as importance issue in SG13 Q15 (Y.3033) and FG IMT-2020
- Contributing to develop Recommendations/Supplements

Highlights from Paper 3

“Network Failure Detection System for Traffic Control using Social Information in Large-Scale Disasters”

- Summary
 - Design and prototype of SNS-based network failure detection system
 - Integration on SNS-based failure detection into network control
- Significance
 - Useful for automatically and autonomically controlling network; applied to real earthquake cases and proved to work fine

Highlights from Paper 3

(Standardization perspectives)

Complementary to ITU-T Focus Group on Disaster Relief Systems

- The method to detect telephony failures with a high degree of accuracy using information from outside of network (in case of emergency such as great earthquakes)
- The automatic/autonomic network control method utilizing collective intelligence analyzed from SNS

Conclusions and Recommendations

- All the papers have high potential to be reviewed for developing as ITU standards.
- Relevant groups:
 - ITU-T SG 13
 - Focus Group on IMT-2020
- Authors are strongly recommended to consider submitting the contributions and get their technologies reviewed/included in ITU standards.



Session 6 – The Need for Speed (Measurements)

S6.1 5G Transport and Broadband Access Networks:
The Need for New Technologies and Standards*

Tien Dat Pham(NICT, Japan)

S6.2: A Unified Framework of Internet Access Speed Measurements

Eduardo Saiz (University of the Basque Country, Spain)

S6.3: Why We Still Need Standardized Internet
Speed Measurement Mechanisms For End Users*

Eneko Atxutegi (University of the Basque Country, Spain)

Session Chair

Remo Suppi (Universitat Autònoma de Barcelona, Spain)

Barcelona, Spain

9-11 December 2015



Highlights from Paper 1

“5G Transport and Broadband Access Networks: The Need for New Technologies and Standards”

- 5G and broadband access networks poses many challenges to the transport networks.
- The need for a variety of technologies and standards to serve different use cases
- Proposed technologies for flexible, cost effective solutions:
 - Analogue radio over fibre
 - Intermediate frequency over fibre
 - Radio on Radio (RoR)
 - Seamless convergence of fibre and radio
- Other issues:
 - Convergence of fixed and mobile networks
 - Co-design, co-operation/optimization of optical and radio
 - Standardization activities

Highlights from Paper 2

“A Unified Framework of Internet Access Speed Measurements”

- The unified framework is designed provide:
 - Neutral and **trust-based** approach to **unify** Internet Speed estimation for:
 - **Operators:** Reliable tool for SLA verification
 - **Users:** Valuable information, comparative results
 - Global QoS observatory to evaluate operators networks
 - Extendable to other Internet based service

Highlights from Paper 3

“Why We Still Need Standardized Internet Speed Measurement Mechanisms For End Users”

- The work presents the current status of Speed tests and their technical problems (Fixed & Dynamic constraints, Test requirements from users POV)
- It describes:
 - A method to multithreaded TCP connection test & warns about suspicious tests.
 - Reasonable “epoch-time” related test duration
- Future work is oriented to:
 - Competing flows randomness
 - Wireless links variable capacity
 - Deep study of real deployments regarding different OS and web browser/mobile app.
 - Required signalling to remove as much as possible TCP flavour dependence.

Conclusions and Recommendations

- We need:
 - New solutions to serve the 2020 demands for convergent fixed and mobile networks.
 - Methods & mechanisms that provide trusted communications.
- This is only possible with standardised solutions



Session 7 – Trust but verify?!

S7.1 Connecting the World through Trustable Internet of Things

Ved P. Kafle (NICT, Japan)*

S7.2: Is Regulation the Answer to the Rise of Over the Top (OTT) Services? An Exploratory Study of the Caribbean Market*

Corlane Barclay (University of Technology Jamaica, Jamaica)

Session Chair

Christoph Dosch (ITU-R Study Group 6 Chairman and Kaleidoscope Steering Committee member; IRT GmbH, Germany)

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Highlights from Paper 1

“Connecting the World through Trustable Internet of Things”

- In ITU there are some workable definitions related to IoT such as
 - Things
 - Devices
 - IoT
- Work ongoing on ITU IoT reference model incl. M2M service layer
- Missing are requirements for IoT infrastructure from micro to macro level include
 - Software-defined/definable network layers
 - Mobile edge computing should be envisaged, i.e. computing close to end-user device (“mobile cloud)
 - Discussion: Standards are needed for reliability of S/W

Highlights from Paper 2

“Is Regulation the Answer to the Rise of Over the Top (OTT) Services? An Exploratory Study of the Caribbean Market”

- Eco-System for OTT is determined by the interests of:
 - OTT providers
 - Telcos
 - Governments
 - Regulators
 - Consumer
- Regulation for OTT varies between countries: from total ban over some regulation to no regulation
- Regulators try to adapt to the changing situations, e.g. consider to distinguish between multimedia OTT and VoIP OTT.
- Especially for developing countries access to BB networks need to be improved to allow for new business models
- Decision needed on whether or not to maintain net neutrality

Conclusions and Recommendations (paper 1)

- Coordination needed with other SDOs on reference architecture for IoT, especially for the (software-controlled) network
- Solve issue of security vs. privacy otherwise people will not be trustful

Conclusions and Recommendations (paper 2)

- Regulators need to adapt to the evolving Internet ecosystem (for example: is VoIP considered a bypass of conventional PSTN)
 - New business models
 - Maintain net neutrality?
- Generally: Access to BB networks (wireless and wireline) needs to be drastically improved, especially in developing countries



Session 8 – Establishing Trust for Networked Things

S8.1 Invited Paper: A Required Security and Privacy Framework for Smart Objects

Antonio Skarmeta (University of Murcia, Spain)

S8.2: Smart Doorbell: an ICT Solution to Enhance Inclusion of Disabled People

Lucas M. Alvarez Hamann and Luis Lezcano Airdi

(Universidad Tecnológica Nacional – Facultad Regional Resistencia, Argentina)

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Mitsuji Matsumoto (Waseda University Prof. Emeritus, Japan; Kaleidoscope Steering Committee member)

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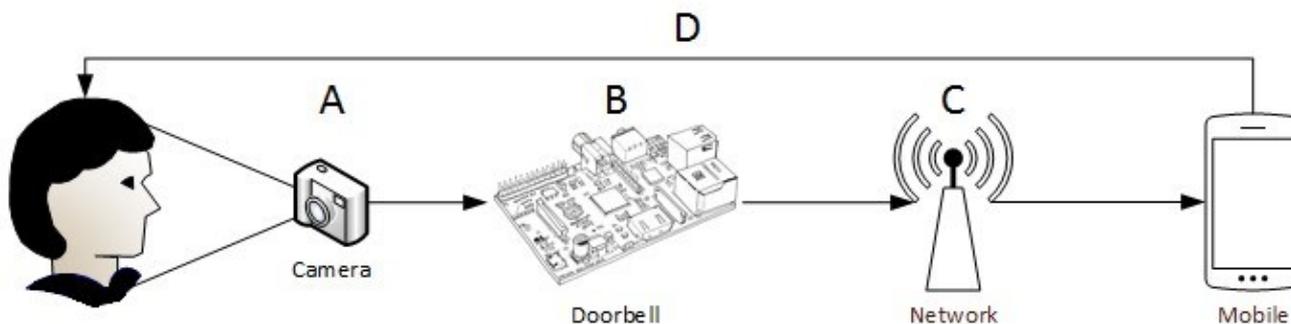


Highlights from paper 1 Invited Paper " A Required Security and Privacy Framework for Smart Objects"

- **Objectives:** An integrated design framework to manage security and privacy challenges in an IoT ecosystem, through the lifecycle of smart objects.
- In the IoT environment, there is a large amount of different objects connected to the network, and it is necessary to construct a large-scale system.
- Management of smart objects during their life cycle is within the purview of many standardisation bodies
- This paper is a proposal for a conscious international standardization.

Highlights from paper 2 “Smart Doorbell: An ICT Solution to Enhance Inclusion of Disabled People”

- Among the seven billion people world population, 14% is accompanied by some kind of disability.
- In particular, the confirmation of visitors is a complex task for people with disabilities.
- The verification system of a valid visitor's identity useful to people with disabilities using open source components
- **Proposal:** Using camera, mobile phone, door bell



- **Experiment:** Correct recognition rate was over 80%.
- Fingerprint Recognition is for further study.

Conclusions and Recommendations

- Existing related standards and ITU Recommendations, can be used for the development of an architecture reference model
- Standardisation is needed:
 - For reliable security and ensured privacy in IoT systems
 - For the assistance of disabled individuals