



## Editorial

## Security and privacy in unified communications: Challenges and solutions



Unified Communications (UC) merge different communication technologies, types of products, and services, from various manufacturers, operators, and countries, following diverse policies and standards. Specifically, in the context of UC, a range of communication tools are integrated in a way that both corporations and individuals are able to manage all their communications in one entity instead of doing it disjointly. It is therefore said that UC bridges the opening between the various computer related communication technologies and Voice over IP (VoIP). However, this high level of heterogeneity expands the risks related to security and privacy that stakeholders should deal with.

One of the major issues in UC is privacy: as users interact with each other and with multimedia servers, the media traffic that passes through different network elements *e.g.*, proxies and trusted as well as untrusted IP networks, reveals private information about users' identity, behavior, location, etc. Taking the aforementioned heterogeneity into account, access control is another topic that requires special consideration in the context of UC. Also, security assessment in general needs special attention since signaling passes through different service operators, and security decisions are based on information gathering from diverse sources. Last but not least, the Bring-Your-Own-Device (BYOD) philosophy followed by many corporations introduces new entry points and leads to more threats in UC.

This special issue presents selected high-quality papers that cover the domain of security and privacy in UC from different perspectives presenting open issues, algorithms, protocols, policies, frameworks, standards, and UC tailored solutions. We received a total of 54 submissions, out of which eight were selected (acceptance rate 14%) considering their quality and relevance to the topic of the special issue.

### 1. Location privacy

While location-aware applications offer significant advantages to service providers and their customers, the privacy risks associated with them can withhold their adoption. Calderoni et al. from University of Bologna in Italy and Bournemouth University in UK, proposed the Spatial Bloom Filter in their paper entitled "Location Privacy without Mutual Trust: the Spatial Bloom Filter". This new data structure together with two proposed protocols preserves users' location privacy when they use location-aware services on mobile devices.

### 2. Privacy in multimedia recommendation systems

Recommendation systems help users of online multimedia delivery systems get meaningful recommendations for other products that might be of interest. The privacy issues behind such systems have been identified and a number of algorithms for privacy protection have been proposed which, however, decrease recommendation accuracy. Feng et al. from Beijing Jiaotong University in China in their paper "Can User Privacy and Recommendation Performance Be Preserved Simultaneously?" proposed a privacy preserving framework which can maintain the accuracy of recommendation systems used on online systems that deliver multimedia services.

### 3. Privacy on eVoting through VoIP

In online surveys where each new question is determined by the answer given in the previous question, participants' privacy is not protected from snoopers even when answers are encrypted. Vera del Campo et al. from Universitat Politècnica de Catalunya and Scytl in Catalonia proposed in their paper "Private Surveys on VoIP" an eVoting framework that preserves end users' privacy in surveys performed on mobile devices utilizing Voice-over-IP technologies.

### 4. Security and QoS in UC

Taking into account the heterogeneity observed in UC scenarios, the assessment of security and QoS is difficult and based on partial information. In their paper "Contextualising Heterogeneous Information in Unified Communications with Security Restrictions", Nieto and Lopez from University of Malaga in Spain provide the extension of a model for transforming heterogeneous information into context-based information and a tool for assessing the security and QoS trade-off in UC.

### 5. Security in CDNs

Content Distribution Networks (CDNs) are networks used for transmitting multimedia streams to end users; their federation into Federated CDNs (FCDNs) involves providers that belong to different domains, making security a challenging issue. Pimentel et al. from Universidade de São Paulo in Brasil, in their paper entitled "OCP: A Protocol for Secure Communication in Federated Content Networks",

propose a protocol for preventing misuse of FCDN resources. Actually, it is a security mechanism that allows secure signaling among FCDNs, addresses route forgery and conceals network architecture from third parties.

## 6. Dynamic access control in mobile cloud computing

Traditional access control mechanisms are not sufficient in an environment where UC enable seamless data sharing across heterogeneous networks and devices from anywhere and anytime. Li et al. from City University in UK and University of Padova in Italy, proposed an access control framework for mobile cloud computing in their paper entitled “Robust Access Control Framework for Mobile Cloud Computing Network”. This solution is based on the inclusion of dynamic attributes in conventional access control schemes with comparable efficiency.

## 7. Identity management on cloud-based UC

While UC over the cloud are on the rise, delegating corporate identity information to cloud providers will be a major issue for enterprises. Beltran and Bertin from Orange labs in France, in “Unified Communications as a Service and WebRTC: An Identity-Centric Perspective”, tackle the Identity Management (IdM) issues found in UC-as-a-Service (UCaaS). In their paper they review IdM models, identify the relevant requirements for UCaaS, and finally propose a modified version of WebRTC to meet these requirements.

## 8. Security in BYOD

As the BYOD concept is gaining acceptance in corporate environments, new entry points are created for attackers and security policies need to be adapted to meet the new challenges. In “Corporate Security Solutions for BYOD: A Novel User-Centric and Self-Adaptive System”, De las Cuevas et al. from University of Granada in Spain propose an open source system called MUSES for securing BYOD environments. MUSES utilizes machine learning and computational intelligence to establish and improve security rules based on users’ behavior.

The aforementioned articles cover a wide range of security and privacy topics in UC. However, the heterogeneity observed in such applications creates an environment where new security challenges will continuously need to be faced. As the convergence of different types of communication means will continue towards UC, we believe that the domains of security and privacy in UC will remain an interesting and important research field.



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