Engineering Sciences International Research Journal
ISSN (Print) : 2330 – 4338 ; Volume 1 Issue 1 ǁ February. 2013 ǁ

# Impact of Accessbility on Cloud Based Opportunistic Computing in Multi - Dimensional Mobility

**U. Chaitanya[1], A.V. Lakshmi Prasuna[2]**

***Abstract:*** With rich resources available in the cloud, mobile users are increasingly depending upon persistent connectivity to cloud-based services, data and contacts. Such services can go well beyond what is possible for a mobile phone acting alone. In this paper, we discuss the SCAMPI architecture designed to support distributed task execution in opportunistic pervasive networks. With opportunistic computing, devices are no longer restricted to using their own services and resources, but can access services and resources made available by other devices. We proposed a distributed system that manages the mobile connectivity of a set of devices belonging to a particular individual, which we call the mobile personal grid (MPG), that to efficiently collect context from a mobile user and coordinate key system resources across the MPG and cloud.

***Keywords:*** Wireles Networks, Mobile Personal Grid (MPG), Opportunistic Computing

## 1. INTRODUCTION

Rich media services that may be accessed anywhere are expected to play a significant role in the mobile apps environment in the next few years. Opportunistic computing (OC) provides an appealing alternative to the mobile computing cloud by allowing devices to join forces and leverage heterogeneous resources from other devices. In opportunistic networks, nodes can communicate with each other even in the absence of an end-to-end path at any given time, as long as there are no tight timing constraints.

In this paper, we illustrate a preliminary study of the impact of the resource availability on the performance of OC, which needs enough resources in the network with connectivity. For mobility-induced dynamics across mobile devices, cloud services inherently impede across heterogeneous networks and further limit the movement of content across multiple devices and the cloud. These limitations become even more pronounced as mobile users use multiple cloud-connected devices that interact with sensors and other embedded computing resources, such a computing environment is the mobile personal grid (MPG), whose seamless connectivity is challenging. Mobile users frequently switch between multiple access networks, interact with multiple devices in multiple contextual environments.

## 2. SCAMPI ARCHITECTURE

The set of available resources is intrinsically tied to the behavior of the people carrying the devices or the human social layer, which includes social relationships among the SCAMPI users. Enabling interactions between the disparate resources is the job of the opportunistic pervasive network layer. The key focus of SCAMPI is in the opportunistic service layer, i.e., on how to abstract service components from the resources available in the environment through opportunistic networking.

Figure 1 presents a layered view on the SCAMPI architecture.

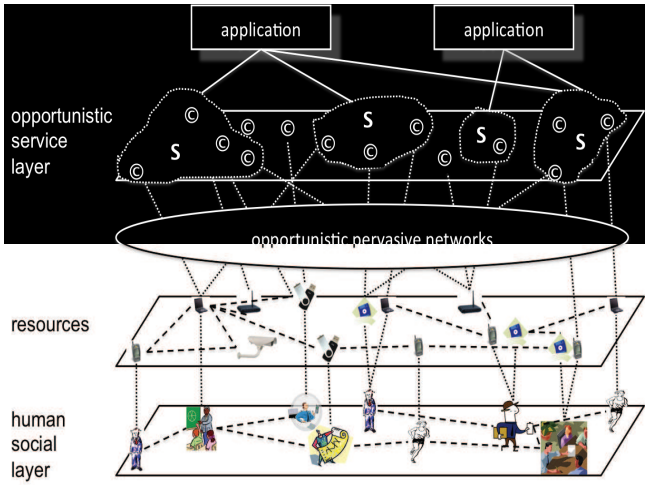


**Fig. 1.View on the SCAMPI environment.**

### *A. Modeling Service Provisioning*

- The SCAMPI investigates the pervasive opportunistic environment by means of analytical modeling. In view of modeling, the resources are seen as service components that have probabilistic reachability and can be opportunistically accessed.
- The composition problem comprises three stages:
  - i Selecting an appropriate service sequence set out of available services.

ii. Forwarding service inputs to the device hosting the next service in the composition.

iii. Routing final service outcomes back to the requester.

Properties such as contact and inter-contact characteristic of the underlying opportunistic pervasive network define how the tasks can be distributed in the network and their results retrieved, and what kind of performance can be expected.

### *B. Resource Stability*

- In wireless networks, the topology depends on the node layout and the wireless link dynamics; the former is time-varying due to relative node mobility, while the latter is time-varying as a baseline due to the vagaries of RF propagation ,primarily multipath fading.
- Mobility and link instability result in scarce predictability. Owing to social behavior of humans, SCAMPI nodes can be expected to group together for non negligible blocks of time in which they remain stationary with respect to one another.

### *C. Distributed Recommendation*

Content sharing is a service that users might naturally expect over opportunistic networks. Indeed, delivering content to mobile users using an opportunistic system is a promising alternative to centralized infrastructure.

### *D. Relation to Online Social Networks (OSNs)*

In SCAMPI, emphasis is put on the design of experiments dedicated to the analysis of social relations, physical meetings, and network communication happening.

- The approach leads to the following benefits.

i. Linking identities cryptographically to existing social network identities such as Face book allows users to initialize social graph information, which can be used to infer social relations at time of opportunistic encounters.

Ii The unique identities enable to relate actions to specific users in OSNs.

## 3. CHALLENGES OF CONNECTVITY

Mobile devices roam in a very rich communication and computing. Two nodes within communication range of each other experience a contact opportunity that lasts for as long as they can hear each other. During a contact, nodes can transfer data to each other. Both the duration and the transfer bandwidth of a contact are limited. A node can deliver data to a destination node directly if the latter is within radio range, otherwise delivery occurs through routing via intermediate nodes.

### *A. Network Connectivity*

Intermittent connectivity poses three key challenges for remote computing.

- First, because the underlying connectivity is often unknown and variable, it is difficult to map computations onto nodes with an assurance that the necessary code and data can be delivered and the results received in timely fashion.
- Second, given that the network connectivity is intermittent, the network is more likely to be a bottleneck for the completion of the distributed computation.
- Third, when there is no control channel, the network cannot be relied upon to provide reachability to all nodes as needed for coordination and control.

### *B. Trends and Challenges*

- **Multiple access networks :** Mobile devices are equipped with multiple network interfaces, including Wi-Fi , Bluetooth, 3G/4G, NFC.
- **Multiple devices :** Mobile users increasingly carry multiple mobile devices such as a smart phone, a tablet, and a laptop.
- **Multiple personas :** Most mobile users carry one or more devices into different environments and context during their daily life. At any one moment, a mobile user may move across all dimensions of mobility simultaneously, creating a challeng- ing environment for a persistent bonding with resources in the cloud.

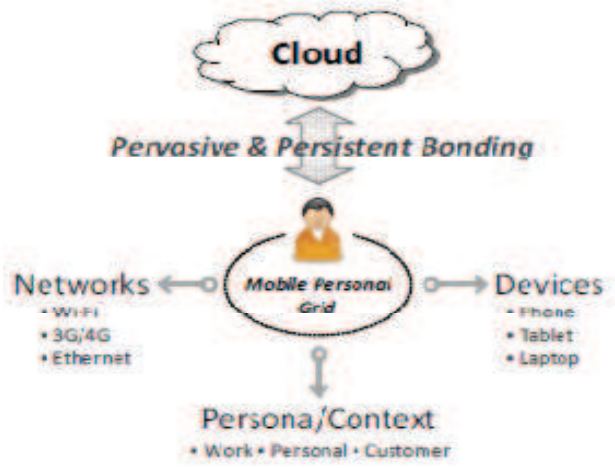


**Fig. 2. Depicts these challenges.**

## 4. RESOURCE MONITORING OF MPG

This section presents Cloud-assisted remote monitoring infrastructure for mobile networks, called Clarinet. Clarinet is designed to monitor the network connectivity and resource availability within the MPG and share the monitoring information with mobile cloud-based applications or services.

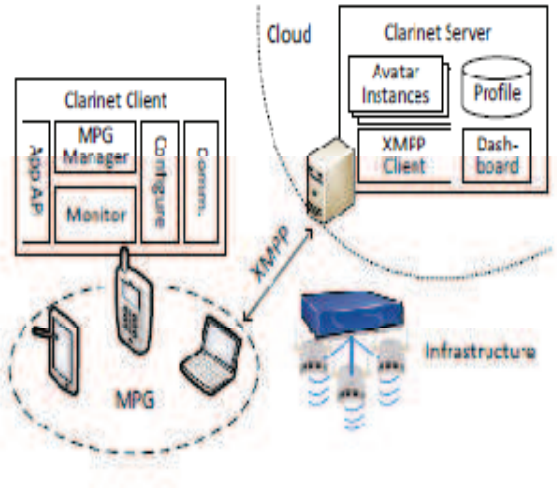


**Fig. 3. The Clarinet design.**

### *A. Managing dynamic MPG*

- Clarinet is a remote monitoring infrastructure that creates and manages the MPG of each mobile user. It maintains an Avatar instance for each MPG in the cloud to keep updated on resource information of the MPG.
- These functions incur a broad set of challenges.

i. Devices in the MPG are dynamic and their radios are heterogeneous, formation and operation of the MPG needs to be deliberately configured.

ii. Clarinet is the creation of the Avatar instance in the cloud for the MPG.

### *B. Selective resource monitoring*

- Clarinet provides a configuration dashboard that allows a user to configure resource monitoring.
- Clarinet provides the interface for users/network administrators to opt on certain monitoring activities in the MPG.
- Clarinet also enables the interaction between Avatar instances of different mobile users and the interaction between the cloud and the network infrastructure.
- Clarinet exposes APIs for application developers or resource owners to leverage monitoring infrastructure.

## 5. CONCLUSION

The social and contextual properties that are available from the rich smart phone APIs provide good fit for supporting applications on individual devices. We have identified key challenges induced by multiple dimensions of mobility-access networks, devices and personas and proposed novel design principles to provide rich and seamless networking experience to mobile users.

## 6. REFERENCES

[1] Kyu – Han Kim Sung – Ju Lee Paul Congdon, On Cloud Centric Network Architecture for MultiDimensional Mobility - Special October Issue SIGGCOMM'12 archive volume 42 Issue 4, October 2012 Pages 509 – 514

[2] Mikko Pitkanen, Marco Conti Andrea, Silvia Daniele, FranckKarinHummel, MartinNidhi Hegde, Tharsyuoulos. SCAMPI: MCC'12 Proceedings of the first edition, MCC workshop, Pages 7-12.

[3] M. Conti, S. Giordano, M. May, and A. Passarella. From opportunistic networks to opportunistic computing. Comm. Mag., 48(9):126–139, Sept. 2010.

[4] M. Conti and M. Kumar. Opportunities in opportunistic computing. Computer, 43(1):42 –50, jan.2010.

[5] T. Hossmann, F. Legendre, G. Nomikos, and T. Spyropoulos. Stumbl: Using facebook to collect rich datasets for opportunistic networking research. In Proceedings of IEEE WoWMoM'11, June 2011.

* * *

[1]*Department of Information Technology, Mahatma Gandhi Institute of Technology (MGIT), Hyderabad, India / Assistant Professor / JNTUH / Chaitanya_udatha@yahoo.co.in*

[2]*Department of Information Technology, Mahatma Gandhi Institute of Technology (MGIT), Hyderabad, India / Associate Professor / JNTUH / lakshmiprasunav@yahoo.co.uk*