C3PO: Spontaneous and Ephemeral Social Networks (demo)
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ABSTRACT
The C3PO project promotes the development of a new kind of spontaneous and ephemeral social networks dedicated to cultural, festive or sports events. They rely on opportunistic communication networks formed dynamically by mobile devices carried by event attendees. In this paper, we present both the opportunistic communication framework we have designed in project C3PO and the Android mobile application we have developed using this framework. We also propose a demonstration, where we will invite conference attendees to use our Android mobile application to cover the CHANTS’15 workshop by exchanging multimedia contents during this event.

Categories and Subject Descriptors
C.2.1 [Network Architecture and Design]: Store and forward networks

Keywords
Mobile Social Networking; Opportunistic Networking.

1. INTRODUCTION
Project C3PO proposes to investigate multimedia content exchange in a new type of social networks, so called Spontaneous and Ephemeral Social Networks (SESNs). Due to their spontaneous and ephemeral nature, SESNs are suited for happenings (e.g., conferences, cultural or sports events). They rely on a peer-to-peer distributed architecture spontaneously formed by mobile devices of event attendees. Opportunistic communication techniques are used to support the connectivity disruptions occurring in such dynamic networks. As a SESN is geographically constrained by the happening location, the set of users collaborating in the SESN is limited.

A SESN can be created by any user and advertised to other users in the vicinity. When the happening stops, peers forming the SESN separate, devices are disconnected and the SESN vanishes. Multimedia contents are massively exchanged within the SESN; all peers receive all contents. Each peer can filter the contents it receives using a set of plugins. The C3PO project objectives are detailed in [2].

This paper is organized as follows. Section 2 provides an overview of the architecture of the C3PO Android mobile application. Sections 3 and 4 present respectively the opportunistic networking framework and toolkit and a plugin-based Web canvas for SESNs. We conclude by presenting our demonstration proposal.

2. C3PO APPLICATION ARCHITECTURE
C3PO targets mobile users carrying off-the-shelf mobile devices. The panel of devices being large and heterogeneous, genericity of the C3PO application is mandatory. C3PO aims at being independent from the operating system as much as possible, and therefore a large part of the C3PO application relies on the today’s in-browser technologies.

Figure 1: C3PO Application General Architecture

The C3PO application, whose the general architecture is represented in Figure 1, is structured in two parts: 1) a user interface implemented by a plugin-based Web canvas that manages interactions with the user and provides user-level functionalities as a set of configurable plugins, and 2) an opportunistic networking framework and a toolkit that make it possible to exploit the different
short range wireless interfaces of mobile devices to interconnect
them, and to perform an opportunistic data dissemination between
devices.

3. OPPORTUNISTIC NETWORKING FRAMEWORK AND TOOLKIT

The C3PO opportunistic networking framework allows to de-
velop Android-based mobile applications using a set of built-in
functionalities provided in the C3PO toolkit.

The Connectivity and Network Management module is respon-
sible for the device discovery and the connection with neighboring
devices. It supports different connectivity types, i.e. Bluetooth,
Wi-Fi Legacy, Wi-Fi Direct and 3G/4G, that can be used jointly to
form islands of interconnected devices.

The Opportunistic Networking module provides two communi-
cation paradigms, namely a topic-based publish/subscribe, and a
channel-based send/receive. It defines a generic mechanism to for-
ward messages in the network, tolerating connectivity disruptions
between devices located in distinct islands. Different forwarding
strategies can be devised, relying on epidemic and network flood-
ing techniques, or implementing more sophisticated techniques re-
lying on content-based, topic-based, community-based, contact fre-
cquency or social-based criteria.

Finally, the opportunistic networking framework defines three
other modules of functionalities, that are respectively dedicated
to the configuration of the framework, to the management of the
events, and to log the traces that are generated by the framework
(e.g., contact and message exchanges traces).

4. A PLUGIN-BASED WEB CANVAS

The SESN user interface is implemented by a plugin-based Web
canvas. This canvas manages interactions with a member of a
SESN. It is responsible for processing and presenting to the end-
user data received by the networking framework. Using this canvas
the end-user can create new contents to be exchanged with other
end-users; he can also promote a received content to stress his spe-
cial interest.

Depending on the SESN happening type, messages may carry
very different contents and thus message processing requires ex-
tensibility. Plugins are responsible for the processing of incoming
messages and for the interaction with the end-user [1]. Each plu-
gin has a specific message processing unit, dedicated to a kind of
messages. For each incoming message, the Message Dispatcher
selects in the Plugin Registry the corresponding plugins and calls
their processing unit. A SESN Canvas organizes plugins in the
graphical user interface. Devices in the same SESN have a set of
identical plugins, but some more powerful devices may also have
additional specific ones.

Some plugins have already been developed in the C3PO project,
such as a) the "Flow" plugin (see the screenshot on Figure 2) that
takes all the received and emitted messages and displays them as a
list ordered with the last received first; b) the "Tags Cloud" plugin
that takes all the incoming messages and builds a tags cloud that
reflects the frequency of each hashtag in the message set; and c)
the "My Journal" plugin that displays all trending messages inter-
leaved with the messages manipulated by the user. At the SESN
termination, it provides a summary of the happening.

5. DEMONSTRATION PROPOSAL

Our demonstration will aim to show to the conference attendees
how to create a SESN dedicated to the CHANTS’15 workshop us-
ning the C3PO Android application, how to publish messages and
photos, and how to promote some contents in the SESN. Confer-
ence attendees will also be invited to install the C3PO Android ap-
lication on their own smartphones or tablets in order to participate
in this SESN. Doing so, they will be able to comment the presenta-
tions, to share photos during the conference and the social events,
to vote for the best presentation or demonstration.

We expect to obtain an interesting feedback from volunteer users
during the conference in order to improve our C3PO application.
Moreover, trace files generated by the C3PO application on each
mobile device will be collected at the end of the workshop. The
confidentiality of the user communication is here guaranteed: the
trace files contain only details about the connections between de-
vices and about the ID of the messages they exchange, but no in-
formation is recorded about the actual content of the messages ex-
changed between these devices. These traces could be reused for
simulation purposes. They also should help understand how an op-
portunistic network relying on different wireless technologies (i.e.,
Bluetooth, Wi-Fi Direct) is formed in real conditions, and should
help us to improve our opportunistic communication framework in
the future.

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http://www.c3po-anr.fr/

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