# Comments on Multi-Window Against Mobile Application Lock

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*Abstract*— **Today's era, Smart phones is one of the biggest concerns in communication. Smart phones play an important role in communication . Smart phones have changed the way of communications. Manufactures such as Samsung and LG have inserted the implementation of multi-window as a special feature to Android. Multi-window enable the user to open and run more than one application concurrently; they also added the App Lock to protect users' privacy. Nevertheless, we show in this manuscript that Multi-window create threats and a security flaw in the App Lock.**

Keywords—AppLock; Multi window; Floating; Docked; Mobile application

## I.    INTRODUCTION

The recent advances in information and communication technology ICT plays a significant role in all aspects of daily life in general [1]. Accordingly, the main concern was to achieve the greatest benefit in communication via Smart phones. Nowadays, smart phones have become necessary for our life due to large capabilities in sending and receiving digital data. Smart phone can be considered as a small portable computer, in addition to its traditional tasks it has many characteristics. Smart phones can carry out multiple services simultaneously from different applications such as Internet browsing, social media communication, email, e-books, etc…

In the last decades, Android is considered as an operating system in the portable devices, it plays an important role in the wide spread of mobile devices regardless of the device producer [2]. Smart phone and its features, applications have been intensively developed by manufactures; Samsung has added the multi window as a feature characteristic in its own Android. Samsung produces different categories and new versions of portable devices every year (e.g., smart phones and tablets). New versions of portable devices have differences and features from previous one. Samsung uses android [3] as an operating system released by Google under open source licenses to develop and distribute their own modified Android operating system. The new Android versions consist of two parts dessert name and numbers such as Jelly Bean(4.1-4.3), KitKat(4.4), Lollipop(5.0) and Marshmallow(6.0) [4].

Provide protection to the smart phone becomes an urgent need and necessary due to its usage and protect users' privacy; the smart phone an essential tool for internet accessing; it also used to store sensitive information. Smart phone users start to use App Lock to hide sensitive information and prevent unauthorized users from accessing their sensitive information.

In recent years, smart phone security and privacy protection have been considered by many authors (see for example, [5], [6], [7], [8] and the bibliography therein). The main objective to analyze the smart phone security and provide a description of related attack. However, most of literatures describe the security flaws in WhatsApp and Viber chats [9].

The main aim of this manuscript is to examine and revise the multi window feature in addition to its categories. Despite of the benefits of using AppLock and multi window features, we show that AppLock feature is vulnerable when a multi window feature is implemented on Samsung portable devices.

## II.    OVERVIEW OF MULTI WINDOW AND APPLICATION LOCK

The Multi window is a famous mobile application, which was launched by Samsung as a commercial product in August 2012 [10]. The Multi window is a mobile application enables customer to run more than one application concurrently in foreground. It has two styles, a feature docked style and a feature floating style. Feature docked style: the user can run and use two applications in the same screen; the window for each application can be resized, swapped and dragged (Fig. 1). While the feature floating window: the user can display more than one application in cascade floating, i.e. application window over each other. The user can drag, resize and swap the windows as well (Fig. 1) [10].

In the dawn of the development of mobile applications, the leading application was the one which protects data by encryption, authentication and the user privacy (see for example [11]-[17]). Accordingly, the main concern was to protect data and user privacy. The contemporary computer systems require of having

antivirus software to be resistant against malicious software's, viruses, worms, etc. The proliferation of digital documents, multimedia processing tools, the worldwide availability of Internet access and network technologies have shown the urgent need of the presence of reliable security in storage accessing mobile applications [13]. The security of multimedia data, social media applications, digital speech data, images, are required in many applications since they are used and accessed through mobile devices. There is an urgent requirement for a smart phone of having the app lock. There are five smart phone application locks, these smart app locks are basically security tools that protect your phone from tedious people. These application locks help you in locking up your mobile applications from being available to anyone who tries to access files on your phone. Google Play [18] provides many security applications, whether free or paid. There are many free applications provide an application lock; 360 security application and CM Security, Voice Screen Lock, Fingerprint Lock, Apps Lock & Gallery Hider, Knock Lock – App Lock Screen, and Smart AppLock (App Protector) are examples of such applications. The AppLock enables the mobile user to lock specific applications and prevent unwanted and unauthorized people to access the applications while providing application lock option.

Observing that, when you download the free application from Google Play, install, and open App Lock, you'll be prompted to create a password. The same password is used for the next authentication to the App Lock; similar scenario is required if you access any of the locked applications. A security e-mail is required as well. Now, you are ready to start locking individual applications - including Phone, Messenger, Facebook, etc. (see Fig. 3 and Fig. 4).



Fig. 1. Multi-window window style [10]

### III. COMMENTS ON MULTI WINDOWS AGAINST APPLOCK

Most of Mobile devices either contain floating multi windows, docked multi window or both, observing that regardless of the used multi window (docked or floating), in both cases, the multi window affects the App Lock . It imposes App Lock to skip the password authentication. This makes the applications vulnerable to several threats and make them available to any unauthorized people who can reach the mobile. This weakness is very critical to the mobile users, especially those who used the App Lock to protect their sensitive information. In the following, two comments on Multi windows and application lock. The first comment shows that the App Lock has a weakness against Floating window; similarly, the second comment shows that the App Lock has a weakness against Docked window.

#### A. Comment 1: Floating Window Against AppLock

Assume that Multi window is enabled as shown in Fig. 5. The weakness can be seen by the following steps:

1. Click recent app button or long click back button as shown in Fig. 6.

2. Press long click on multi window icon in the locked applications as shown in Fig. 7

3. The locked app will be opened directly, and the multi window will impose the App Lock to skip the password step as shown in Fig. 2.

#### B. Comment 2: Docked Window Against App Lock

Assume that Multi window is enabled as shown in Fig. 5. The weakness can be seen by following former steps 1 -3, the obtained results are shown in Fig. 8 for step 2 and Fig. 9 in step 3.

#### C. Proposed Solution

To overcome the former weaknesses, a simple scenario can be followed by disabling the multi window, but this is not a good solution, since it will prevent the use of the new feature. This will make the applications are vulnerable to unauthorized people.
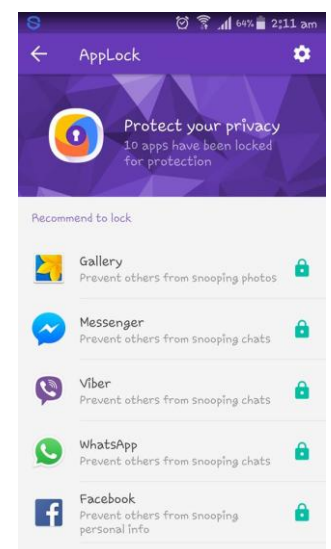


Fig. 2: Impose App Lock to skip password



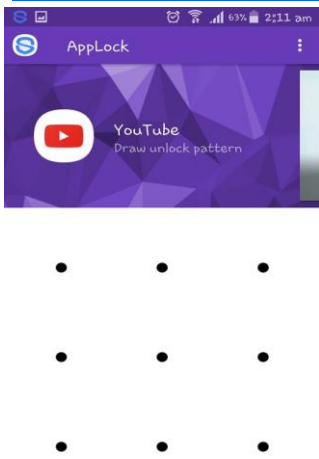Fig. 3: Select an application to be locked

Fig. 4: Application is locked
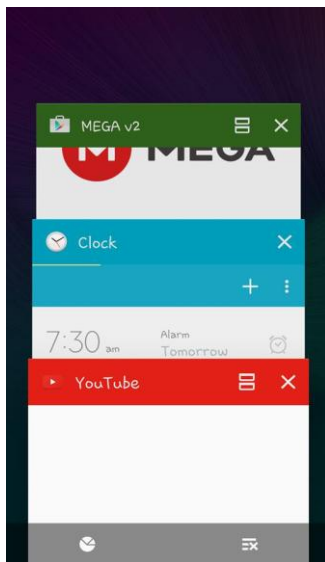


Fig. 5: Multi window is enabled.



Fig. 6 Recent bottom is pressed.



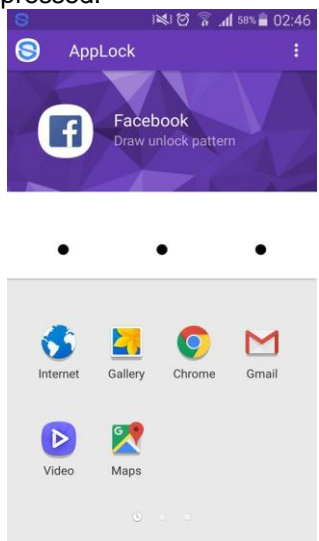Fig. 7: Multi window icon surrounded by red



Fig. 8: Docked multi window display two applications, first application is locked.
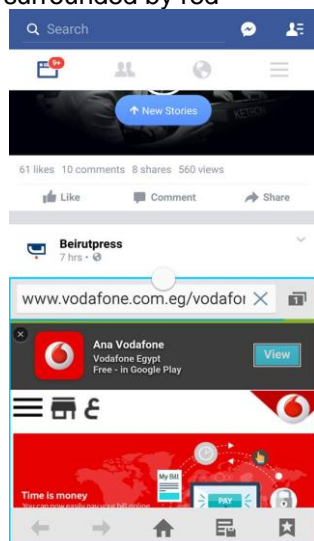


Fig. 9: Result when first application is locked and when app is not locked

## IV. CONCLUSION

In this paper, the multi window and App Lock have been considered. We show that the famous App Lock application can be easily broken by using the multi window.

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