

WHITEPAPER

External Independent Display (EID) Support in Android

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Table of Contents

Abstract:	3
1. Introduction	3
2. About External Independent Display (EID)	4
3. Scope of Study	5
4. Advantages EID Solution	5
5. Use Cases	6
6. Business Impact	7
7. Conclusion	7
8. References.....	7
About L&T Technology Services	8

Abstract:

This document presents a study on the External Independent Display support in Android based tablets having HDMI port. Currently tablet Original Equipment Manufacturers (OEMs) having dual display support in android tablets with mirror mode offered by Android. But, External Independent Display (EID) solution study offers true native resolution of HDMI display to the users with independent applications running on each of the displays.

Keywords:

External Independent Display (EID).

Original Equipment Manufacturer (OEM).

1. Introduction

The recent trend in personal computing devices has seen a replacement of laptops and desktops with tablets. As the gap between tablets and Laptops/Desktops is reducing, tablet Original Equipment Manufacturers (OEMs) are adding more and more features to encourage users to switch to tablets. With the addition of new System on Chips (SOCs) which provide increased CPU performance and at the same time provide better battery performance, CPU speed is not the hindering factor for a user to make a switch to tablets. One of the factors which users like about their Desktops is the large screen and use of keyboard and mouse when at workplace rather than using the touch input. **External Independent Display (EID)** brings tablets one step closer to replace the Desktops. EID is a low cost solution developed by **L&T Technology Services** that can be integrated to the tablets running on Android OS.

Tablets enabled with EID feature will allow the user to use the true native resolution of the display. The more exciting feature of EID is that you can have two different applications getting rendered on either of the displays simultaneously. User can play the HD videos on external monitor in true HD resolution.

2. About External Independent Display (EID)

Most Android tablets have an HDMI port for functions of video output. This port allows you to connect your tablet to an external display such as a monitor or television, to view items on your tablet on a much larger screen. This is the mirror mode offered by standard Android. The user can continue executing his apps on the tablet and the external display device continues to show the copy of the image on your tablet screen. The content which is rendered on external display is eventually scaled from the primary display resolution to the external display resolution. This at times gives a blur effect to the user on external display.

The EID solution enhances the Android OS by providing an EID mode. The EID mode enables graceful rendering of independent applications on the tablet screen (primary display) and the external monitor (secondary display). EID mode can be illustrated using an example. In the example, the user can start video meeting app on the external display leveraging high resolution video display and have an app displaying business statistics on the primary display or vice versa. In the second example user does not need to minimize his video conferencing session while referring to the documents on his/her local tablet.



Fig. 1: External Independent Display (EID) Feature

3. Scope of Study

The scope of the paper encompasses to add support for an independent HDMI display to Android based tablet. Both the displays (primary and secondary) should work simultaneously. Android OS modification to add a separate display pipeline for secondary HDMI display.

4. Advantages of EID Solution

- It provides a larger display as an alternative display which is more convenient for applications like browser, documents and email.
- User input is managed by using mouse for apps rendered on External display while LCD's touch for primary display
- Provides support for multiple resolutions for secondary display-the best display resolution will be read by framework at runtime when the monitor is plugged in & hence HD videos are not scaled down.
- Provide choice to switch between Mirror mode and EID Mode at runtime without rebooting the device.
- User can switch an application from one display to another.

Comparison with Mirror mode:

- EID allows simultaneous rendering of 2 independent apps in Android whereas in Mirror mode same app is cloned on External display
- HD Videos can be played with the same high resolution & need not be scaled down as in Mirror mode.
- Takes full advantage of External High Resolution Display.

CPU Load:

	Secondary Display Decode window at 1024x600	Secondary Display Decode window at 1920x1080
Average CPU Load	27.02%	28.86%
EMIF Data Bus Load	38.63%	37.08%
SGX 3D core Load	66.6%	62.2%
SGX TA load	12.5%	18.2%

Fig. 2: Memory utilization in EID solution.

5. Use Cases

Enterprise level VDI application

Virtual desktop infrastructure is the server computing model enabling desktop virtualization. Enterprise-level implementation of this technology allows users to execute applications on a remote central server from a tablet or thin client which exceed the tablet hardware's ability to run. However, small size of tablet screen makes using the desktop applications difficult.

EID mode offers an alternative to tablet screen by offering a larger display with higher resolution. Thus the desktop application like PDF reader, browser, and email can be used conveniently without straining the eyes.

Contact center video phones

In the EID mode, the contact center agents can receive the video call on tablet, while interacting with the integrated CRM apps on the external display.

6. Business Impact

The successful implementation of EID for our customer's Android tablet device has raised the customer's confidence in our abilities to deliver challenging solutions in quick time frames.

This technically challenging low cost feature will be a great value add to the current User Experience for tablets.

7. Conclusion

The low cost EID support will act as a major differentiator for any Android based tablet as a unique solution. The tablet powered with this feature will be a trend setter while acting as a strong replacement for desktops.

8. References

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About L&T Technology Services

L&T Technology Services is a wholly-owned subsidiary of Larsen & Toubro with a focus on the Engineering Services space, partnering with a large number of Fortune 500 companies globally. We offer design and development solutions throughout the entire product development chain across various industries such as Industrial Products, Medical Devices, Automotive, Aerospace, Railways, Off-Highway & Polymer, Commercial Vehicles, Telecom & Hi-Tech, and the Process Industry. The company also offers solutions in the areas of Mechanical Engineering Services, Embedded Systems & Engineering Application Software, Product Lifecycle Management, Engineering Analytics, Power Electronics, and M2M and the Internet-of-Things (IoT).

With a multi-disciplinary and multi-domain presence, we challenge ourselves every day to help clients achieve a sustainable competitive advantage through value-creating products, processes and services. Headquartered in India, with over 10,000 highly skilled professionals, 11 global delivery centers and operations in 35 locations around the world, we constantly find flexible ways of working, tailored to our assignments and customer needs.

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