



Android Platforms in Television

Mapping Out a Strategy

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Executive Summary

With the growth of the Android mobile phone market and the growth of video playback on phones and tablets, Android has been improving over the years to ensure QoS for video streaming.

Operators, Multichannel Video Programming Distributors (MVPDs) and other video providers looking for their next generation solutions may want to consider whether an Android integrated Software and Hardware solution should be on their short list of choices. Android is already viewed as a platform that is synonymous with IPTV. With the growth of the Android mobile phone market and the growth of video playback on phones and tablets, Android has been improving over the years to ensure Quality of Service (QoS) for video streaming. That means Android-based solutions provide a solid baseline for STB development.

There are many things to consider when reviewing Android, starting from selecting the System on a Chip (SoC) to determining the requirements of the application framework and selecting the User Agent for the User Interface (UI). Much of this is also dependent on selecting between Android TV and Android Open Source Project (AOSP).

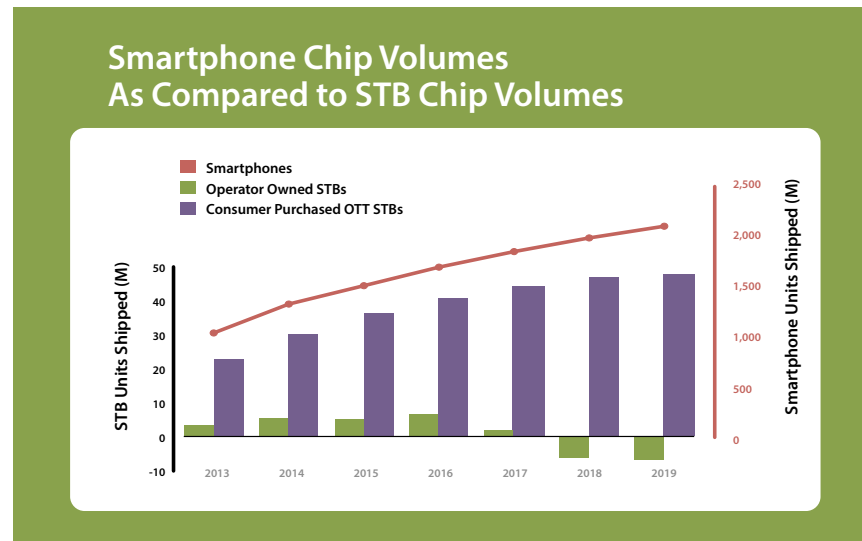
Walking through the decision tree and understanding the implications of those choices will not only guide operators in determining whether Android should be their next video platform, but will also help guide how they develop their solution if they take the Android path.

The Android CPU Revolution

The number of Android based SoCs has exploded over the last few years, making it easily the most common software platform over the largest number of CPUs. If we review the history of Android development, we see that fabrication improvements have significantly driven down the size of the SoC while simultaneously driving up the performance. The first Android chips from Qualcomm were 65nm fabrications with 528 MHz performance for the T-Mobile G1. The currently shipping Samsung Exynos 5430 is 20nm, reducing circuitry interconnection by more than two thirds, with up to 1.8 Ghz CPU performance. From 2015 to 2016 the next chips arriving are 16nm from TSMC and 14nm from Samsung and Intel, with ARM and TSMC looking at 10nm to follow soon after. The current trend seems to tail off at a 7nm design as the endpoint.

The volume of chips manufactured, driven largely by the smart phone market, allows for all this investment to drive down size and cost and to

improve performance. It is impossible for more targeted STB chipsets to come close to the volume of manufactured Android Chips. These ever-shrinking but increasingly more powerful chipsets are also driving miniaturization of STB designs, whether in an HDMI stick form factor, or a small puck. They are also moving in a direction requiring less power, meaning energy savings for the consumer.



The chart above reflects the past and anticipated growth of smartphones in comparison to traditional STBs; notice the STB numbers are in millions while the phones are in 100s of millions. The unusual negative number on STBs shipped reflects the trend of consumers cutting the cord resulting in a negative outcome for overall STB installations. With this kind of volume and the trend for every device to be a video streaming platform, it is easy to understand why Android is logically growing as a platform choice in STBs.

There are many things to consider when looking at the SDK that is delivered with a given SoC. Android based SoCs are often developed for specific use cases, so the Software Development Kit (SDK) can vary significantly. For example, codecs for video playback are specific to a chip, including supporting new formats such as H.265 (HEVC) for 4K television, and variations of chips that support High Dynamic Range (HDR). In addition, the SoC must meet the necessary security requirements for content protection. If an operator is considering delivering Ultra HD to the device, this may need even further scrutiny, as content creators have readdressed the requirements for Ultra HD content protection. Covering all these variations and choices is beyond this

analysis, but suffice it to say there is a broad range of selection when considering the SoC for Android-based video products.

Android TV or AOSP?

One of the first discussions to come up around Android is whether to develop a platform based on Android TV or Android Open Source Project (AOSP). This is a critical decision, as Google wants customers to go one direction or the other, but not both. The difference is largely about how much control you want with your product.

Android TV

The Android TV platform comes with all the Google bells and whistles, including some special features such as location services for maps. The most important feature is the Google Play store; with the Android TV platform, the MVPD is required to provide a fully open Google Play store, allowing users to download any app they want onto the STB, similar to a smart phone. The model for using Android TV seems to be shifting somewhat, for example it is possible Google will let the MVPD control the overarching application that launches when the device is turned on so that their app becomes the central control for the device. This means users would not be able to delete the MVPD app, but could add and delete other apps as desired.

Google has also been hanging out a pretty sweet carrot by suggesting that while MVPDs will have contractual agreements for the license with some fees, they are likely to be masked by the revenue sharing offered by Google for apps and advertising. These negotiations vary from operator to operator based on the size of the subscriber community, but they are working hard to convince operators to go with Android TV. A caveat you might watch out for is how much data Google will be able to gather from subscribers. This is likely the prime reason Google is interested in MVPDs using Android TV—the core business of Google is collecting and monetizing data.

AOSP

Android Open Source Project (AOSP), as the name suggests, is an open source platform allowing developers to create any type of application for an Android Environment. AOSP is essentially a subset of Android TV.

The reason to consider AOSP over Android TV is to have control over the complete solution. For example, in the Android TV environment, the subscriber must be able to download any other app they want onto the device through the Google Play store. Some operators feel that many of those apps will distract subscribers with secondary video services from the main service they are providing. This is very similar to a Roku environment, except that the MVPD would be the start-up app giving them more visibility.

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However, in AOSP, operators can create a walled garden and negotiate very specific partnerships for complementary content and content aggregators. These business agreements require an app from that provider that will run on AOSP, but the APK (the build file for Android applications) for an Android TV app will run in AOSP as long as it does not use any unique Android TV services. It is important to note that when the APK is delivered from the Google Play Store, it is modified slightly; AOSP requires the basic, unmodified APK.

An example of a company that decided to use AOSP over Google Play is Amazon. The Amazon Fire TV devices use the AOSP development environment, giving Amazon complete control over what they determine to offer on the Amazon TV platform.

As operators look to attract Millennials they can consider alliances with content partners that appeal to those audiences and provide new channels through a separate app, securing the relationship with a business agreement complimentary to both. For example, consider OTT providers such as Hulu, or access to a YouTube short-form series like “The Guild,” or “Convos with my 2 Year Old.” Integration of selected content catalogs with a recommendation engine can provide a compelling environment for subscribers, making it easy for them to spend more time watching content and less time looking for content to watch.

As operators grow their businesses, the AOSP environment also allows them to consider other value added applications, whether gaming or IoT; the AOSP environment lets operators decide which add-ons will be most beneficial to their core video services.

One very important benefit of both Android TV and AOSP is the pool of software developers available to hire. With the plethora of developers working in Android Java development environments and the mature tools available for software development, basing any product on Android will make the development process easier. This also means the possibility of quicker turnaround for testing and updating the code.

Application Framework

As with other STB operating system (OS) choices, a strong application framework that dovetails with Android can provide a complement of features to support all the requirements for delivering live television. With the right application framework, operators can smoothly deploy new STBs with the necessary requirements for a complete television delivery system.

The Application Framework can bring a variety of supporting software for a robust video solution. This may include such things as an Application Manager that allows multiple applications to run simultaneously, for example watching live TV while also checking the weather. In this case it is important for the remote to know which is the current app and how to close it to return to the operator's app. The framework can also ease implementation of EAS (Emergency Alert Systems), Closed Captioning and pairing with a variety of devices, among others.

User Experience

Selecting a flexible and fully featured application framework will allow the operator choices for the user agents they employ for application development, sometimes allowing for multiple UI methods. For example, the primary UX could use the Android Java development environment, but other apps or applets could be HTML5. Since most MVPDs are supporting secondary consumer applications, an Android STB could make it easier to create native Android apps that work on the STB, and with some tuning, on the other target mobile devices used for content viewing. While it is becoming easier for device to device communication, having the primary STB based on Android will ease integration with some consumer devices.

Security

Content Security

Securing content is critical for any MVPD as they are contractually obligated to ensure that the content they serve to subscribers cannot be copied.

Content security in legacy STB hardware often used a CableCARD implementation along with Conditional Access Systems (CAS). The CableCARD era is on its way out as new methods of content protection become necessary with multi-screen deployments allowing access on consumer devices, but CAS is still a viable and strong candidate for content protection. Since Android TV and AOSP have to comply with content creator requirements for content protection, both platforms have ensured that the right framework is in place to support a variety of content protection schemes. This framework is based on DRM security that provides both content rights validation and content encryption. This security is dependent on the SoC in the device that, for robust security, should provide a secure boot loader and an isolated OS trust zone with key encryption support. This combination of software and hardware is necessary to secure content.

The Android implementation provides an API for the DRM framework so that a solution can implement a variety of content protection agents. A deployed system could have more than one application, and each might use a different DRM, such as PlayReady or Alticast AltiProtect.

The DRM model also includes licensing metadata, which determines the ability of any piece of content to be watched based on parameters such as Subscriptions, Devices, Geography and also the expiry or repeatability of the content itself. This allows for a variety of business models for content access.

As Ultra HD grows in the market, the requirements for content protection become stricter. Having a partner conversant in security is important to navigate the integration of security, including performing the tests necessary to pass certification.

Other Security

Beyond content protection, there are a number of other security requirements for the STB. These include account protection, user data protection, application data protection, potentially a 'household firewall' for IoT operations and more. With the increasing number of apps used for personal data, such as health monitoring and home monitoring, overall security is coming to the forefront of any new STB conversation. Some new apps coming to STBs include pairing or operation from consumer mobile and tablet devices. Those connections usually are bound over WiFi networks using various communication protocols, for example Bluetooth.

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The Bluetooth consortium has been addressing security head-on to ensure that when a user is controlling something with Bluetooth, others cannot listen in or hack in through a back door. AOSP has worked hard to consider security models to make sure there are underlying safeguards in place for these other important security needs. This complex topic is beyond this paper, but it is important to make sure all security requirements are determined when selecting a new STB platform.

Monitoring and Maintenance

The ability to keep maintenance costs down is very important for MVPDs; this is one area which may need development to deliver tools that ease updating, maintaining and monitoring STBs. The wealth of Android application development has driven good development and test frameworks. When properly implemented and applied, these tools will allow operators to more easily and frequently push updates out to their subscribers.

Having an application platform that can gather device data, both maintenance and user behavioral, is important for ensuring a reliable experience for the subscriber and for providing data to recommendation apps to make the content engagement experience unique and easy.

Good tools for monitoring and updating the STB should have a goal of overall cost reduction for support services. As with other STBs this may include using TR-069, TR-232 and/or SNMP protocols with associated modules that perform a variety of data services. These capabilities become even more valuable as MVPDs add other services to their STBs and may be passing a variety of data to cloud services. These databases could include new IoT services for controlling devices inside and outside the home. A well-designed infrastructure for managing data will be critical as these services continue to grow.

Conclusion

The process of selecting an STB platform can be complex. Along with determining the primary requirements for a box, such as inputs/outputs, DVR and memory, deciding on the CPU(SoC) is an equally important decision. In the past this choice was driven by a manufacturing model which designed CPUs that were very market specific, but with video

becoming so ubiquitous, CPUs have become very versatile so they can deliver a plethora of services to a variety of devices. SoCs designed to support Android for TV services are shipped in such a high volume that the performance of these chips exceeds those of vertical market chips at a lower cost.

Focusing in on the product for the subscriber will guide the MVPD down a path using AOSP or Android TV. A good development partner will be able to work with the MVPD to deliver a quality product that will prove to be easy to develop and maintain.

Alticast

Finding a strong partner to bring Android solutions to the market helps the MVPD leverage the features of the chips while ensuring that all the necessary requirements for video delivery are met. Alticast has been working with Android devices since the early days, developing everything from application frameworks, to UX, to security. Alticast can act as the systems integrator to take the project from inception to deployment working with all constituents, either internal or external, for a timely and successful product launch.

References

Androidauthority.com Rob Triggs Dec. 2014

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