Android-Based Mobile Devices communication Using Peer 2 Peer Network Channels

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Abstract— The interest grew between scholars and researchers for exploring some of the facts about how we can channelize the usage of P2P to a wide variety of modern day applications. The usages namely for P2P applications includes Instant Messaging, file Sharing, Voice over IP, Video streaming and social media. This paper tells about the methodologies on how P2P works in general for getting a complete Abstraction for below application protocols and even a summarized description on how P2Pised applications work. Moreover, this paper tells about peering and how sharing is done in P2P application for easing work of developers. Furthermore, the paper provides the limitations and different obstacles in adoption of P2P in the cellphone's technological environment. Lastly, there is a conclusion on a bit of presentation of direction for future research so that appropriate middleware can be developed and decided for appropriate use-cases for implementation in Android OS.

Index Terms— P2P, Android OS, Mobile Environment

I. INTRODUCTION

Android is all over the world. The android phones have advanced to an unimaginable extent, as the tech in android phones is widespread because of their impressive multimedia application accompanied by convincing power usage, instantaneous processors, and gadgets having great resolution cameras. These days' people on the media upload everything. Let us assume a user wants to transfer the pictures clicked on a smartphone to the laptop or desktop. A wireless connection like Bluetooth, cellphone networks or Wi-Fi is used irrespective of the distance.

Although this approach is commonly preferred, it restricts its usage at an elevated cost. A peer-to-peer (P2P) service is a distributed framework that helps two users to connect with one another directly without the necessity of a mediator. Instead, the buyer and seller utilize the P2P service to conduct direct transaction. The P2P platform may offer searching, inspection, grading and payment processing and escrow may all be available through the P2P platform.
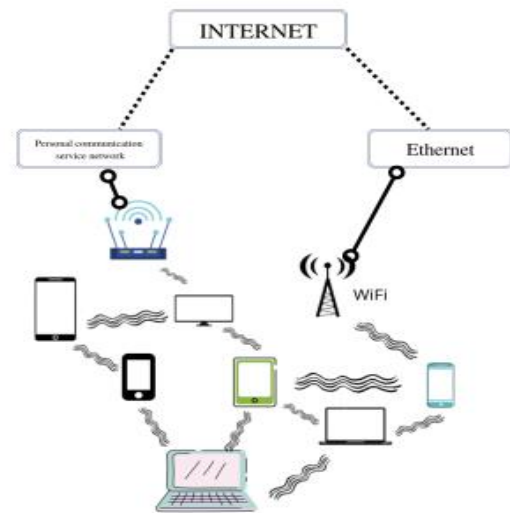

Fig: 1

The form of the P2P protocol in a mobile setting is mostly determined by the core wireless connection. Nevertheless, Lightweight Operating System running on the device is used to design P2P applications. The manufactories design and assemble gadgets at a moderately affordable price due to endless competition and market. In the suggested study, there are several reasons for picking Android-based mobile devices such as the Google Android platform (an open source).The programming language Java supports application writing that has access to the software development kits (SDKs) which brought a significant revolution to Android.

II. RELATED WORKS

This section provides a review of findings on android system and middle layers. It also includes a complete paraphrasing of the previous researches that are already carried out on various p2p-enabled platforms. Some works which carries weightage in consideration of mobile p2p includes"P2P Protocol for Mobile Phones" [2], the JXTA Project [3], JXME [4] Project, and Jupiter [5].

JXTA design started in late 2000 and is still ongoing. The designers can hence incorporate the p2p messages using the most popular XML message formats this feature is provided by JXTA. The different holdings of peers are considered and are hence carried up privately or publically in to relays, which on the other hand is connected to the mobile platform with a certain amount of low but fixed outcomes.

Which includes the working processor, Resourceful memory and lasting battery juice. to the JXTA environment is the next JXTA project, which is JXTE for J2ME is known as JXME [4]. This project developed two versions of JXME proxies and proxy less depending on the way that mobile JXME peer can access the service of JXTA network. The explanation for the terms or the functionality is that the first version requires the peers to be in a relay and this acts as an

starting point for the JXM .Whereas, in the second version of JXME, here a complete proxy less framework is guaranteed and hence no serviceable relay is needed for the continuation of connection this method is currently latest tech which is used in modern applications which insures the complete lot to be proxy less and fast connection implementations.

The intentions of these approaches are strictly not to match a real-time network. As it will not only make the applications very incompatible and will distract peers in a future longer run .These are few example of the middle wares, in different areas, which uses peers. "Jupiter" [5] is a peering and progressing middleware that makes things possible for intrinsic and thus heterogeneous networks .This insures usability and working of devices on and up to various underlying platforms all on same framework.

There are many implementations of peering soft wares that incorporate the combination of both network and application layers for smooth and better user experience. Socket programming is carried out for effective outcomes.

III. THE ANDROID P2P MIDDLE-LAYER

The suppose condition we have to take while construction of any P2P application is that they will need a support underlying OS for the environment which can be expected to empower the Mobile phone for which the application is supposed to be designed. Moreover, the P2P channeling provides for both the synchronous and Asynchronous pattern of communication**.** In which the Asynchronous could be taken up as a future advancement. Now talking about the

environment it is displayed in the Fig 2. All the comprising structural elements can be thought upon as the Hardware that is the foundation after that the kernel and different sensors and device drivers comes followed by the Android OS.

Google's OS as it is really Lightweight Appropriate for P2P communications and forth comes all the supporters for the P2P communication that are Middleware, different API's and last is our application that communicates out to application present on other android device. Let us talk a bit about the Lightweight OS that is Android here developers are free to roll out their own Android-SDK, hence addition to the Android Library. Therefore, the great advancement of the P2P technology can be easily possible.
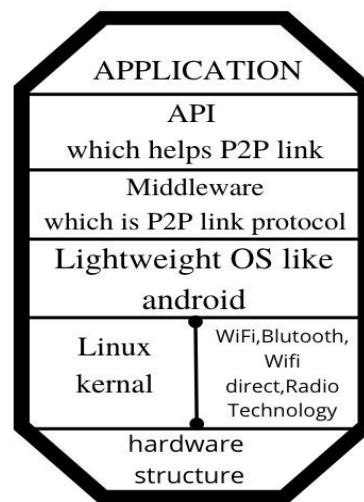

Fig 2

Hence in the node the assumption of P2P is to be of greatest in terms of communication speeds and in very less in traffic instability that is the reason the OS choose is a lightweight to remove the overhead useless Functions and features of a heavyweight OS.

The network suitable for live communications can be available on a network-enabled smartphones. Consequently, the current research means to upgrade the convention for portable P2P middleware on the highest point of Android OS along with APIs as to support application advancement for an Innovative Digital Economy climate. To accomplish this, the portable middleware will utilize the current remote advances like Wi-Fi or Bluetooth, which are upheld by Smartphones what's more, the middleware expects to help and upgrade the direct P2P correspondence among clients.

How useful can be a P2P framework can be illustrated by a scenario where there is college students they need to share their files , Messages and even some time need to have virtual meetups . All can be achieved on a same application platform. Still in this the problem that affects this brilliancy is the limited data packs as it can be really costly at 3g and limited 4g packs for doing expensive data consumption activities like uploading chunks of data to an online server

and always need to download whenever we need to retrieve the data. Hence as solution Bluetooth and Wi-Fi-Direct P2P enabled platforms and frameworks can indeed help in achieving the no cost transfers but again the fact and transfers relies on the distance and proximity closeness or in layman terms closeness between two participating devices . Hence, no cost data transfers and video conferences can be made in close distances that is in Bluetooth or max to max, Wi-Fi ranges. At last, it is trusted that incorporating Wi-Fi Direct into cell phones, even Bluetooth and LAN as a short range remote organization advances, it can feasible for clients to be offered more chances to utilize the P2P correspondence in an immediate way with next to no connect switch or passageways. In any case, it ought to be conceded that the proposed applications are yet confined because of the restricted association in numbers by utilizing Wi-Fi in an organization.

IV. RESEARCH METHODOLOGY AND HYPOTHESIS

The methods that is taken on in this research is illustrated in fig 3. It is true that the route network follows is quite complex at this point. Therefore, the choice of mobile networking constraints are still the important issue for the speculation. The expectation is that after applying the appropriate P2P middleware the user's experience and interfacing on Android-Based Smartphone in a few subjects will upgrade or get to the next level. Moreover, little tweaks can be made to the P2P middleware for controlling short-reach wireless networks like Wi-Fi-Direct and Bluetooth. According to need it will be more conceivable tochoose the kind of remote innovation network to be utilized in view of various applications and the Distance between the gadgets. Nonetheless, selection of what actions are going to be performed and in which mode can be chosen by user. In expansion security, measures for flagging potentially, untrusted users from local database can really add up to the advancement of the applications. Finally, Testing should also be incorporated to recognize the flaws in networks appropriately.
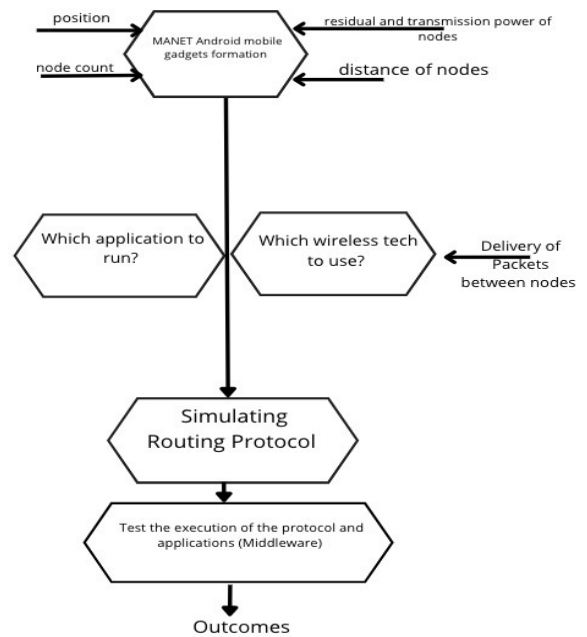

Fig: 3

V. ARCHITECTURE OF THE ANDROID PLATFORM

The built-in procedures and support that aid consumers in accessing various apps are distinctive elements of Android design. It is also feasible for keeping restrictions on other device applications. With some introspection and a few minor tweaks to the manifest file of the program, consumers who are unable to complete such an application will never be able to see it in the Android Market and will not have any difficulties attempting to download it. It implies that the system can control what sorts of gadgets have access to its apps and how to make them ready so that they reach the appropriate audience. [1], [11]. Based on the analysis, it is clear that Android is becoming a more viable platform for developers to create rich and innovative applications. They may also use their time to appreciate the device's supremacy, access various information sources, even services that run in background memory can be altered to one's need. Because the programmers use APIs, the same framework is freely available to developers. As a result, the application architecture's function is stated as a process of simplifying component reuse. It means that every program can publish its capabilities, which have a high likelihood of being reused by other apps. Furthermore, the user may replace these components using the same technique. According to a hierarchical definition of the Android system, it is designed as of five parts: the kernel that is of Linux, Internal libraries, framework, Android run time, and so on, as illustrated in Fig 4: Android is primarily based on Linux 2.6, which supports primary system services such as security, resource and process management and driven model. As a result, the

system's prime component is equivalent to an invisible layer between the hardware and different software components in the complete system module. B. Android runtime is made up of a collection of majorly C++ programs and various components that are currently in use. The Android framework may be used to provide different capabilities to developers. The bulk of functionalities is provided by Android's core libraries to Java class libraries. It is also self-evident that each components shown in Fig. 4 of Android Operating System Architecture [6] application runs completely independent or in its own criteria or channel , and it benefits from the Dalvik virtual machine's unique instance, which efficiently supports many components running over the same application. C. Framework for the Application The application construct is meant to make component reuse easier; any application's capabilities may be issued and eventually can be again used by other applications. The user can replace components using the same technique. D. Applications In the development of Android applications, the Java language is majorly incorporated. The SDK tools wrap the code, as well as all resource and memory files, with the .apk extended file. For Android-powered devices, the complete code in a single. Apk file is considered a program and an installation file.

Fig: 4

VI. IMPLEMENTATIONS AND SERVICES FOR THE P2P SYSTEM

The vast majority of popular P2P programs are for file-sharing service, which began with Napster and advanced through KaZaA and Gnutella to Bit Torrent. [7]-[8]. Likewise, voice-over-P2P (VoIP) apps for making voice conversations, namely Skype are additional P2P applications that are benefitted from mobile P2P and may be converted to work in a mobile P2P environment that relies on direct connections between any kind of mobile phones. The diversity of smart devices and P2P system's desired interoperability with them Peers might complement each other in a pool of varied characteristics created by stationary hosts. The following are some potential P2P application areas to examine [9], [10]: Last-Mile Connectivity: cellular or data

networks do not cover several rural locations, like farms, and have not any Internet access. The self-organizing mobile Peer to Peer network is necessary to connect peers with people who have access to the internet or cellular networks. More peer-to-peer (P2P) apps may be developed for usage within the ensemble mobile environment to disseminate data about traffic, extreme circumstances, and routines. Texting: Another popular type of P2P application is instant messaging (IM). IM may simply be deployed on mobile devices to be a time-insensitive service. According to the routing protocol, each peer will only hold a message until it can be sent to corresponding peer that is the destination's neighbor. Many IM programs have been integrated into contemporary mobile platforms, although they are all Internet-based. Audio Conversations: Many VoIP services, such as Skype, take advantage of P2P networks to deliver real-time audio and video conversations. Voice communication services do not have a specialized infrastructure, nor do they necessitate a lot of processing power or bandwidth. Delivery of Content: Clients in peer-to-peer networks both offer and consume resources. This means that, unlike client-server systems, peer–to–peer networks' content-serving capacity can expand as more people access the material. One of the most significant benefits of adopting P2P networks is that it reduces the setup and operating expenses for the original content provider. Multiplayer Gaming: In the ensemble mobile environment, The suggested enhanced P2P apps for games requiring many players will be available both online and offline in the local P2P network. Networking locally and socially: Twitter and Facebook social media sites are becoming increasingly popular for connecting individuals who have shared interests, and the inclusion of geographical information, while still in its early stages, will bring influencing potential. In addition to fostering these skills, social media platforms must be modified to function on the ensemble mobile platform irrespective of Internet connectivity. Uploading Videos/Images: This is among the most interesting ones of Network applications so far. Certain occasions, such as sporting events or other special occasions, bring individuals together who have a shared interest. Their closeness enables the establishment of a local mobile P2P network,allowing peers to share photographs or movies. Due to the enormous connections in a limited region, such events are well known to be a difficult challenge for mobile networks. Video on demand (VOD) and video streaming and are presently accounting for a sizeable portion of mobile data traffic and is expanding fast.
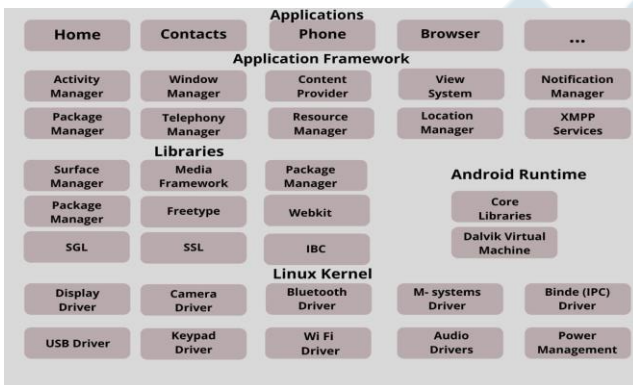
VII. LIMITATIONS & OBSTACLES

As a consequence of the increasing adoption of P2P principles in the ensemble mobile environment, there are still a number of obstacles to solve in this field. To summarize, the variability of the mobile environment creates additional

such issues (users, devices, networks). As a result, new criteria for P2P in ensemble mobile contexts should be taken into consideration, and they are as follows [11], [12]:

- P2P search traffic overhead should be as low as feasible so that mobile device that transmits data speeds may be boosted.
- Due to the open and non-deterministic nature of the nodes, which join and depart regularly, significant churn rates need to be handled.
- Because of broken connections and exhausted battery energy, the chance of failure should be carefully controlled, and mobile devices must be enhanced.
- The resource constraints of mobile devices, as well as the heterogeneity of nodes and the device's different capabilities, must be taken into account.
- Trustworthy and Reliable models should be available to enable the users wish to follow protocol norms.
- The produced physical layer's traffic should be taken into account the physical network characteristics. To address the problems, notably mobility and heterogeneity, it is critical to incorporate these criteria in the proposed mobile P2P protocol for the ensemble mobile environment. These restrictions are settings thatthe protocol creator may tweak to make it more suitable for a certain mobile device.

VIII. CONCLUSION

It is becoming clear that a middleware with a better protocol for Android-based smartphones is required. As a result, the integration of this middleware would enable the greatest characteristics of both MANET and P2P system middleware. The suggested middleware with upgraded protocols is anticipated to permit smartphone users to communicate in real-time via various Android P2P apps. We will deploy the protocols for genuine Android-based mobile devices to evaluate the practicality and good performance of the generated protocol after simulations to analyze the performance of the constructed middleware with protocol and prove that it works as expected. Further, a more in-depth research is required in forthcoming publications.

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