ENHANCED 5G HETEROGENEOUS NETWORKS

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ABSTRACT

A multivariate network (headnet) is a topology created using multiple headsets under macro cell (MC) coverage. It can improve network performance, extend cell coverage and offline network traffic, For example, the network traffic of a 5G mobile communication network. A headnet includes a combination of radio technologies and different cell types. During a headnet, the integration between MCs and small cells (SCs) has a positive impact on the performance of the networks, resulting in a general user experience. Therefore, to enhance user perceived service quality, HetNets require high efficiency network protocols and enhanced radio technologies. During this study, we are introducing the 5G headset that includes MCs and standard and mobile SCs (MScs). Exclusive MScs are often loaded on a car, bus or train and have different characteristics to standard SCs (FSCs).during this paper, we address the technical challenges associated with mSCs. In addition, we analyze network performance under two headings - MCs and fSCs, and MCs and mSCs.

Keywords

MCs, SCs, Het-Net

I. Introduction

The 54,514,397 mobile subscribers in Korea, 38,160,077 use smartphones, according to a 2013 investigation by the Korean Ministry of Science. Moreover, 23,993,469 of them are LTE users .Given LTE's short history, these figures reveal the explosive increase within the number of smartphone users in Korea. we expect that this trend may be a worldwide trend, as long as Korea may be a test market countryforIproducts.

In the era of 5G, an outsized number of mobile smart and Internet of Things (IoT) devices will generate various sizes of knowledge traffic, starting from a couple of bytes to upwards of several gigabytes; for instance , small sensing data of IoT networks, and ultra high definition video services, which have a resolution of . Such devices can cause an explosion in dynamic data traffic volumes on mobile networks.

Many researchers have foreseen that data traffic will increase within the order of over 1,000 times the present rate over subsequent 10 years. Therefore, it's getting to be almost impossible to handle 5G data traffic with the traditional networks of today. Moreover, 5G mobile network protocols got to be made more flexible so on be ready to operate within heterogeneous networks (HetNets).

1. KeyTechnologies

Toward 5G Many researchers and businesses have their own vision for 5G wireless networks, some of which have issues with Each Other, as Follows

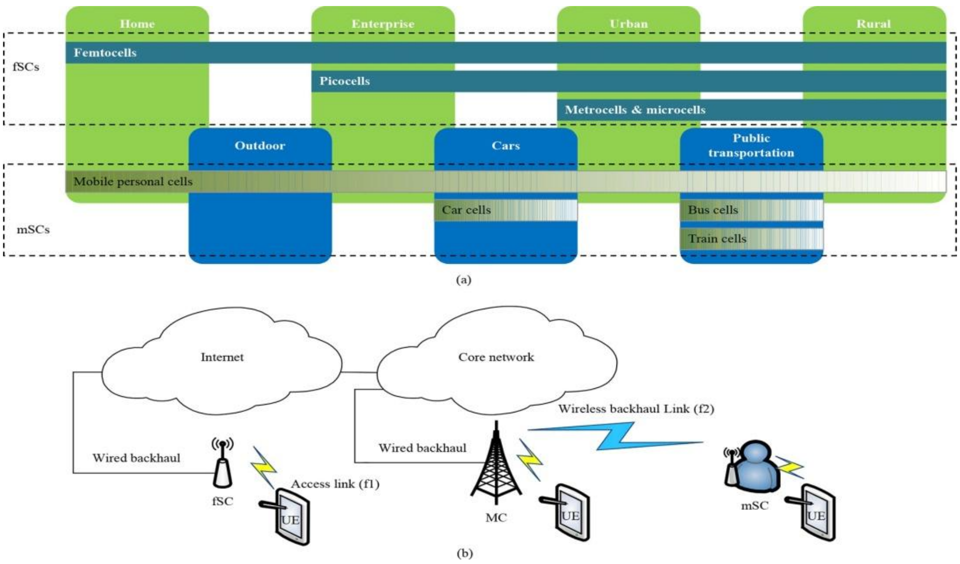
1. Hetnet For Cell Densification
   New Carrier Type (Nct)
   Massive Multi-Input And Multi-Output And Serial Antenna Technologies
2. Users/Contents/Network Context-Awareness Network
   Iot: Engine - Type Communications (Mtc) And Device - First - Device (D2d) Communication
3. Green Networks: Energy Efficiency And Price Effectiveness
   In This Paper, We'll Introduce Mobile Small Cells (Mscs). Therefore, We Address A Number Of The Key Technologies Associated With Mscs.

2. HetNet

A HetNet may be a topology with a cell densification technology that overlays multiple tiers of mobile communication network cells; for instance , if there are picocells and femtocells within the coverage of a macro cell (MC), then a three tier HetNet is made . the tiny Cell Forum defines small cells (SCs) as “an umbrella term for operator controlled, low powered radio access nodes”.

In other words, an SC is defined to be a low power mobile network cell that's under the control of mobile network operators. this is often the difference between WiFi access points (APs) and SCs. Additionally, the tiny Cell Forum classifies SCs into four classes consistent with applications and therefore the size of their coverage.

Fem to cells, having the littlest coverage, are utilized in the house , picocells are used for enterprises, metrocells and microcells, having the most important coverage, are used for public hotspots and rural mobile services, respectively. However, all of the SCs defined by the tiny Cell Forum aren't considered as mobile nodes.



HetNet architecture.

The features of a HetNet are as follows:

■ Dense cell alignment with reduced cell size

■ dynamic deployment and operation

■ flexible backhaul

■ Policy Access Policy: Closed Subscriber Group (CSG) and Open Subscriber Group (OSG) methods.

Dense SCs increase network capacity and extend coverage, and they are ready to use and operate at low cost.Moreover, SCs are often deployed and controlled adaptively consistent with certain situations and specific purposes by both mobile operators and users; for instance , covering a temporal hotspot zone. Additionally, SCs operate no matter the sort of backhaul, because they're connected to a core network (CN) of an operator through their own Internet connection. In other words, the backhaul link of an SC are often any Internet link; for instance , an Ethernet or optical cable. this versatile backhaul is one among the foremost important differences between MCs and SCs, as SCs don't require the high cost backhaul link of a mobile operator. features of SCs are policies for mobile subscribers.

There are two modes. the primary may be a CSG mode, which allows access only to subscriber group members; thus, only allowed users are often served by a CSG cell. The second mode is an OSG mode. An OSG cell provides service to any user in its coverage.

OSG and CSG access policies are often combined; for instance , an SC serves its members with higher priority and serves non- members with the remaining resources after scheduling the traffic transmissions of members.

3. NCT

The rapid increases in mobile data growth and use of mobile devices are creating unprecedented challenges for wireless service providers to beat a worldwide bandwidth shortage. Therefore, it's essential to accumulate new spectrums and an efficient NCT technology. NCT technology is almost ready for practical use; as an example , millimeter- wave technology [5]. The target carrier frequency of NCT is 5 GHz or more.Therefore, we'll expect higher throughput. However, there is a tradeoff. In other words, the upper waveband can cause more attenuation. Enabling NCDs for small-cell backhalls has many challenges.Nevertheless, it's expected that various technologies currently being actively studied will overcome the challenges.

Note that the use of an mSC in itself isn't a totally unique concept; however, the deployment of mSCs has become more practical because of the introduction of NCT. We hope that the introduction of MScs with high-speed wireless backhaul connections on mobile headsets will help bridge the gap between standard SC (FSC).

The advantages of such mSCs are as follows:

■ the space between serving base stations (BSs) and users is shorter.
■ Dynamic control is out there .
■ mSCs operate during a context-aware state.
■ mSCs are an enabler of IoT.

Firstly, the distances to be served to BS and MSc users are closer than those of MC and FSC users. This means that the required transmission power of both the downlinks and the uplinks is small.

Transmission power is one of the foremost important parameters in mobile equipment because less transmission power results in a extended battery life. Second, mSCs can function as a private BS. Therefore, dynamic control is out there . as an example , owners of MSCs can pack up their mSC if the link conditions of neighboring cells are ok . Alternatively, they're going to turn their mSC on if there aren't any available neighboring fSCs or the signal qualities of neighboring MCs are not suitable for sufficient services. Additionally, MSC owners can provide contact links to neighboring users or their social networking service (SNS) friends (depending on policy decisions).

Third, a user can provide the specified permissions so as that dynamic controls, like those mentioned above, could even be performed automatically. Fourth, mSC are often a key technology for IoT. mSCs can provide low- cost access links to talk with a CN or servers on the online with low cost for D2D and MTC. Moreover, mSCs may play a task as a cloud computing hub if they adopt to those mobile cloud computing service models specification of a three- tier HetNet with MCs, fSCs, and mSCs. MCs are connected to a CN of mobile operators through a wired backhaul link and have two kinds of access links, f1 and f2, for user equipment (UE) and mSCs, respectively. fSCs are connected to the online and thus the CN through a wired backhaul regardless of backhaul type. An MC supports the link between CN and MSc.

mSCs use NCT technology as their wireless backhaul link and serve users via the access link, which is additionally used as an access link by MCs and fSCs. We assume that an mSC operates as a standard UE from the standpoint of an MC, while an mSC may be a traditional eNB for UEs. Protocol Shares OP The Bitrate Mobile Headnet.

We can use mSCs in various applications. we'll use mSCs as personal mobile BSs. In such a scenario, various personal devices can attach with the online or each other through an mSC. mSCs can also be used as mobile personal cloud servers if they contain storage. Therefore, the private devices of an owner can share information about contexts and repair content.

Them the specified access. Another example of an appropriate application is cars. An mSC during a car provides an access link to varied devices within the car itself. additionally , it can connect with any in built car safety information system or intelligent transport system infrastructure; thus, an mSC are often a car safety server. The last example could also be a public transportation application. This application is analogous thereto of a personal car application, except that it's for the requirements of the general public. In other words, mSCs are often openly accessed by passengers on a bus or train. In addition, MSCs may provide travel information from booked data or by communicating with a navigation system or information transport system infrastructure.

Capacity Enhancement: The network capacity during a mobile network is particularly determined by system bandwidth and traffic volume. We did simple simulations with the OPNET simulator to determine the amount of UEs that can be supported on both the same network and the mobile headnet.

The topology of our simulation environment. An MSc consists of both a backhall connection and connected user devices. mSCs operate at a special frequency to MCs. The mode of operation of the MScs is assumed to be found in the random path model, thus covering all possible MSc applications.The mSC users follow their serving mSC. we've executed the simulation by employing a workstation that has the next specification:

- CPU: Intel Core i7–4790, 3.60 GHz
- memory (RAM): 16 GB
- OS: Window 7 64-bit

III. Challenges

A mobile headset with MScs is a viable solution for 5G headsets.However, there are challenges in commercializing this solution with optimal performance.During this section, we describe the challenging issues facing mSCs. Several previous studies have addressed the differences between the MC layer and the FSC layer.Therefore, we specialize in the differences between fSCs and mSCs to introducemSCs.

1. Interferences in HetNet with mSCs

There are several studies to mitigate interference within the Headnet. In these studies,the foremost reasons for such interferences are the difference in transmission power level between MCs and SCs. However, there are additional issues in regard to interferences during a HetNet with mSCs that are related to the mobility of mSCs. Interferences will fluctuate dramatically compared with those found during a standard HetNet without mSCs.

A. Inter cell Interference

Inter-cell interactions occur between any cells regardless of layer. the actual fact that both current and future OFDMA- based mobile communication networks wouldn't have intra cell interferences is further evidence of the actual fact that every one the interferences during this three tier HetNet are intercell interferences.

B. Inter tier Interference

This type of interference is called inter-layer interference if a service cell and intercept cell are at least several layers apart from each other.especially , if the serving cell is an SC and thus the interferer cell is an MC, as is that the case in “(B)”. this interference is important due to the difference in transmission power between an MC and SC.

C. Intra tier Interference

Intra tier interference is that the other of inter- tier interference. If a serving cell and an interferer cell are within an equivalent tier (for example, “(A)” and “(C)” in Fig. then this type of interference is called intra-layer interference.

D. Dynamic Interference

Dynamic interference could also be a newly defined term for the requirements of this paper, resulting from our introduction to mSCs. Dynamic interference occurs when either a serving cell or an interferer cell could also be a mobile node. there's a stimulating difference between the two cases (D) and (E). The interference just just in case (D) are getting to be stronger, because the serving cell and interferer cell are on the brink of every other; and therefore the other way around .

E. Semi−static Interference

We could define such non dynamic interferences as static interferences; however, we are choosing to define them as semi static interferences because of the existence of user mobility and other variables; as an example , fast fading.

F. Backhaul Interference

There are often interferences between backhaul links of mSCs that are connected to other MCs or other MC sectors. Due to the fact that mSCs operate identically to UEs in our specification, backhaul interference may be almost identical to common inter-cell interference.

2. Network Mobility

In this section, we look at network movement analysis; For example, handover and restoration after connection failure.during a standard mobile network that only has MCs, most network mobility changes occur at the borders of cells. However, due to the dense and arbitrary use of SCs during a headnet, network association changes can occur anywhere.

1) Search For Neighboring Cells
2) Computer Data Measurement For Detected Neighboring Cells
3) Cell Evaluations And Mobility Decisions
4) Mobility Execution Upon Decision

In this article, we have introduced the MScs for further enhancements of the 5G mobile headset.We compared an mSC-applied HetNet with a standard HetNet having only MCs and fSCs from the purpose of view of watching overall network performance in consideration of higher-layerprotocols.

CONCLUSION,

A HetNet may increase the lower-layer network performances. However, more enhanced studies are required to affect higher-layer network issues; for instance , network mobility solutions and higher-layer protocol design. Therefore, we acknowledged the challenges and required research issues for 5G HetNet and mSC technology. Our currently ongoing studies and future works also are mentioned within the last section of this paper.

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